Institutionalized Authoritarianism: Political Incentives, Land Resources, and Development Outcomes in China

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Submitted to the Graduate Faculty of

the Dietrich School of Arts and Sciences in partial fulfillment

of the requirements for the degree of

Doctor of Philosophy

University of Pittsburgh

2024

UNIVERSITY OF PITTSBURGH

DIETRICH SCHOOL OF ARTS AND SCIENCES

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March 27th 2024

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University of Pittsburgh, 2024

This dissertation investigates the political and economic impacts of institutionalized political selection within authoritarian regimes. Contrary to prevailing theories that suggest meritocratic promotion within party systems contributes to regime stability and economic performance, this dissertation indicates that such promotion rules can reduce regime stability and hinder long-term economic growth. I focus on the performance-based promotion rules in the Chinese political system and argue that the career incentives for politicians lead to violations of non-elite property rights, intensifying conflicts between governments and citizens, and undermining regime stability. Additionally, the state's monopoly on economic resources leads to collusion among ruling elites, encouraging rent-seeking behaviors. Moreover, institutionalized promotions prompt lower-ranking officials to misallocate resources in ways that favor their career advancement, thereby impeding the potential for economic growth. By analyzing 600,000 residential land transactions and the career records of local officials from China, I demonstrate that local party secretaries with strong career incentives often manipulate land prices. Using causal mediation analysis with survey and protest data, I illustrate how career-motivated politicians drive increased collective actions, with interventions in land pricing acting as a mechanism. Furthermore, by examining politically connected firms' land transactions, I reveal rent-seeking engagements between government officials and firms, and demonstrate how local officials strategically select auction methods to benefit connected firms. Finally, I develop a formal model within a principal-agent framework to demonstrate an "amplifying effect," wherein the political incentives of principals exacerbate resource misallocation among subordinates, hindering long-term economic growth potential. Overall, this dissertation challenges the notion that meritocratic promotion of party cadres in authoritarian regimes enhances regime stability and economic performance.

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Preface

Being a first-generation graduate student is a unique experience filled with challenges. However, the support from my advisors, family, and friends has made this journey more enjoyable.

First, I would like to express my deepest gratitude to Michaël Aklin and Iza Ding, my committee chairs, for their invaluable guidance, patience, and expert advice throughout my PhD studies. Their insights and feedback were crucial in shaping both the direction and the conclusion of the dissertation. I still remember the first time I met Iza after arriving at the University of Pittsburgh. She encouraged me to be bold and open-minded in my studies, which has been a guiding principle throughout my journey. Michaël has been my academic advisor since my second year. I am always amazed by his ability to transform my unorganized and immature research ideas into coherent arguments. He has believed in me and has been my closest reader, providing valuable comments and moral support throughout.

I would also like to extend my heartfelt thanks to Max Goplerud, my advisor and co-author. Our method project was the starting point that introduced me to the world of political methodology and greatly enhanced my knowledge and skills in this area. He also guided me in harnessing computational skills and resources for conducting fascinating social science research. This knowledge later became crucial in developing the empirical chapters of my dissertation.

I also want to thank Melanie Manion, to whom I owe a special debt of gratitude. Without her encouragement during my time at Duke University, I would not have pursued my PhD studies. I vividly remember her asking me if I had a deeply intriguing puzzle that could keep me awake every day, suggesting that if so, I should apply for a PhD. I deeply appreciate the knowledge, perspective, and encouragement I have gained through our mentorship.

I would like to thank many other faculty members in the department: Jude Hays, Steven Finkel, Burcu Savun, and Emily West. They have always been my go-to people for advice and feedback. I also want to thank Danny Choi, my unofficial advisor and friend, who has been extremely generous with his time, advice, and encouragement.

Outside the department, I have received valuable feedback on my projects from Bonnie Meguid, David Stasavage, Jan Pierskalla, Junyan Jiang, Laura Paler, Mai Hassan, and Yuhua Wang. I am also grateful for the financial support from the department, the Asian Studies Center at the University of Pittsburgh, and the Hayek Foundation.

I would also like to extend my thanks to my friends and colleagues for their understanding, moral support, and endless patience during this demanding period.

Last but not least, I would like to thank my wonderful family. I owe a profound debt of gratitude to my parents, whose unconditional love and support have been the foundation of my resilience and determination. To Jinyi, my wife and best friend: her unwavering faith in me and her ability to bring joy and balance to my life have been my guiding light throughout this journey. Her understanding and patience, especially during times when my research demanded more from me, have been extraordinary. Her love and companionship have turned this challenging journey into an unforgettable adventure we embarked on together. Finally, special thanks to my puppy, Beta. His presence, with a wagging tail and a comforting nuzzle, has brought smiles in moments of stress and served as a much-needed reminder of the world beyond my research. He is a cherished family member.

1.0 Introduction

Existing literature highlights the crucial role of institutionalized party systems in bolstering regime stability and economic performance in authoritarian countries (Gandhi and Przeworski, 2007; Geddes, Wright and Frantz, 2018). One central mechanism by which party systems contribute to regime longevity is through credible power-sharing among ruling elites. By adopting rule-based procedures for the promotion of party officials within the hierarchy, a party system fosters stable career trajectories for party cadres and reinforces their commitment to the regime's ongoing stability (Magaloni, 2008; Landry, 2008; Magaloni and Kricheli, 2010; Svolik, 2012). Moreover, institutionalized power-sharing helps to mitigate commitment problems and imposes constraints on the dictator's arbitrary actions, thereby reducing the risks of expropriation and enhancing economic performance (Gehlbach and Keefer, 2012; Boix and Svolik, 2013; Bizzarro et al., 2018; Meng, 2021).

This dissertation challenges existing views by presenting theoretical arguments and empirical evidence that institutionalized promotion within an authoritarian context can decrease regime stability and impede long-term economic growth potential. I focus on the meritocratic promotion system in China, where the career advancement of subnational leaders largely depends on their economic performance. I argue that the career incentives of party cadres lead them to mobilize resources for their own political and economic benefits. This strategy critically depends on their capacity to secure sufficient resources, which inevitably drives them to infringe upon the property rights of non-elites to amass the necessary resources. The widespread infringement of property rights among the general population breeds resentment towards the regime and exacerbates conflicts between the ruling elites and non-elites, posing a risk to the regime's stability. Additionally, the monopoly over resources encourages rent-seeking behaviors among the ruling elites, undermining the effectiveness of formal institutions. Moreover, meritocratic promotion systems further encourage political leaders to invest resources in projects that promise rapid economic growth, enhancing their chances for advancement but neglecting long-term development needs. As a result, these politically motivated incentives cause significant misallocations of resources, ultimately im-

peding sustainable economic development.

To support my argument, I examine the career incentives of prefecture-level leaders in China. Local leaders in China participate in a tournament-style promotion system, where a large pool of potentially eligible local leaders competes for a limited number of higher-level positions (Li and Zhou, 2005; Lü and Landry, 2014). The institutional foundation of such a promotion system is regionally decentralized authoritarianism (RDA), wherein the central government delegates significant decision-making power over administrative and economic matters to local and regional authorities while maintaining strong control over key aspects of governance (Landry, 2008; Xu, 2011). This institutional configuration enables the upper-level government to assess local officials based on their relative performance (Qian and Xu, 1993).

Local leaders seeking career advancement must meet various policy objectives set by higher authorities (Li and Zhou, 2005). While there is an ongoing debate about the influence of merit versus patronage in promotions, evidence indicates that GDP growth plays a crucial role in officials' advancement, especially at the municipal level (Jia, Kudamatsu and Seim, 2015; Landry, Lü and Duan, 2018; Jiang, 2018; Xi, Yao and Zhang, 2018; Chen and Zhang, 2021). These institutional mechanisms, recognized by scholars and practitioners, have contributed to political stability and the significant economic growth observed in China over the past few decades (Shirk et al., 1993; Qian and Xu, 1993; Landry, 2008).

I utilize this setup to study the impact of political incentives on resource misallocations in the land and real estate markets. I focus on them empirically due to their critical importance as assets for both individuals and the state. The ownership of land affects the behavior of both political elites and the general public, with far-reaching implications for public policies, conflicts, and democratization (Moore, 1993; Ansell and Samuels, 2014; Ansell, 2014; Finkel, Gehlbach and Olsen, 2015; Albertus, 2020). Specifically, in the Chinese context, the property and real estate sectors significantly contribute to GDP, constituting around 25 to 30% (PIIE, 2022).[1] Local governments in China have monopolistic control over public land, and previous research indicates that local leaders exploit land resources for political gain (Whiting, 2011;

[1]This percentage is relatively high compared to the average contribution of the real estate sector to GDP in the United States, which is about 15-18%; source: bit.ly/3QOdHTT.

Lin, 2014; Rithmire, 2015; Su and Tao, 2017). However, the intricate relationship between the career incentives of local officials, land resources, and their political implications remains underexplored.

The empirical component of this dissertation utilizes three datasets from China. First, I have collected 3 million land transaction records from a digital archive that encompasses all land transactions in China. These transactions, which range from 2000 to 2020, cover industrial, residential, commercial, and infrastructure land. I geo-located each land transaction and merged the dataset with geospatial data, such as nightlight intensity and population density around each land parcel, as well as the geographical distance to the city center and railway stations, to create a detailed micro-level dataset. Second, I gathered biographical data on senior executives, board members, and board of supervisors of publicly listed firms in China. This data is used to construct measurements of firms' political connections. Finally, I obtained the career records of prefecture-level leaders from Jiang (2018). This biographical information includes the times, locations, organizations, and administrative ranks of every mayor or party secretary throughout their careers.

1.1 The Map of Dissertation

This dissertation examines the negative consequences of institutionalized political selection within authoritarian regimes, focusing on three critical political and economic outcomes: 1) protest, 2) rent-seeking, and 3) resource misallocation and its impact on long-term growth potential. Consequently, my dissertation is structured into three empirical chapters.

The first empirical chapter analyzes how local leaders exploit land resources to enhance their career advancement, inadvertently leading to protests and jeopardizing regime stability. I argue that the career incentives of politicians within party systems incentivize violations of non-elite property rights, generating distributional injustice and escalating conflicts between governments and citizens. Utilizing data from 600,000 residential land transactions, surveys, and protest records from China, I demonstrate that: 1) local party secretaries with high career incentives tend to manipulate land prices, 2) career-seeking politicians contribute to

heightened collective action on land issues, with land price intervention serving as the channel through which career incentives impact collective actions, and 3) distributional injustice is the mechanism that drives conflicts between citizens and governments. These findings challenge the notion that meritocratic promotion of party cadres in authoritarian regimes enhances regime stability.

The second chapter examines rent-seeking behaviors within local governments, particularly how local leaders manipulate formal institutions to benefit politically connected firms. I differentiate four mechanisms that link firms' political connections to economic rents and unpack the channels through which firms obtain benefits from political ties. Using data from Chinese publicly listed firms' land transactions and a comprehensive dataset of their different types of connections, I differentiate how firms': (1) reputation, (2) local political influence, (3) access to information, and (4) institutional embeddedness affect land prices and the ways in which firms purchase land. I find that firms with local political influence receive the largest price discounts compared to other types of connections. More importantly, local connections enable firms to enter into auctions where they can manipulate land prices before and during the auctions, while firms with good reputations benefit only from restricting potential competitors. My findings demonstrate that different types of political connections differ both in the magnitude of their impacts and the mechanisms through which they operate.

The third chapter presents a formal model within a principal-agent framework, illustrating how political incentives amplify resource misallocation and its detrimental impact on long-term growth potential. The model identifies two types of efficiency losses: "institutional failure," where principals' political incentives lead them to formulate policies that deviate from the optimal economic allocation, and "agency failure," where local leaders' optimal political resource allocations do not align with those of the principal. The model predicts an "amplifying effect," wherein institutional failure exacerbates agency failure, causing a greater deviation from the optimal economic allocation. By analyzing the career incentives of both prefecture and provincial leaders in China, this study confirms such an amplifying effect. This chapter establishes the connections between political institutions, resource allocations, and economic development.

2.0 Institutionalized Political Selection and Its Impact on the Stability of Authoritarian Regimes: Evidence from China

2.1 Introduction

The institutionalized promotion of cadres within single-party regimes is generally believed to enhance regime stability (Magaloni, 2008; Landry, 2008; Svolik, 2012; Geddes, Wright and Frantz, 2018; Meng, 2021). By grounding advancement on rule-based and predictable criteria, a hierarchical party system provides a clear pathway for the career progression of party officials. This institutional arrangement ensures the alignment of interests between authoritarian regimes and their ruling elites, thereby contributing to regime stability. However, this chapter argues that institutionalized promotion systems in authoritarian countries can exacerbate conflicts between the ruling elites and the broader non-elite population, undermining regime stability.

To support my argument, I focus on political systems where the career advancement of subnational party leaders is largely influenced by their economic performance. Such systems create incentives for party leaders to focus on economic development. However, they also generate perverse incentives that motivate them to distort resource allocation, leading to increased political conflicts. I argue that the career incentives of party cadres drive them to mobilize resources to achieve their political and economic objectives. However, this approach crucially depends on their ability to amass sufficient resources, which unavoidably incentivizes them to infringe upon the property rights of non-elites to secure those resources. Moreover, career-minded officials often align themselves with economic elites to garner support, further marginalizing non-elites and making them more susceptible to exploitation. The widespread infringement of property rights among the general population breeds resentment towards the regime and exacerbates conflicts between the ruling elites and non-elites, thereby posing a risk to the regime's stability.

To analyze my argument, I explore the impact of career incentives for prefecture-level party secretaries on residential land allocations in China. I collected an original dataset

comprising 600,000 observations on residential land transactions in China between 2000 and 2015. The data include details such as the date of the transaction, land location, buyers, plot area, intended land usage, selling methods, and land quality. I geo-located all land transactions and merged the dataset with geospatial data, such as nightlight and population density surrounding each land parcel, as well as geographical distance to the city center and railway station, to construct a comprehensive micro-level dataset. Furthermore, I matched the land transaction data with the career records of local political leaders from Jiang (2018). Finally, I obtained city-level protest data from Zhang and Pan (2019).

The empirical challenge lies in constructing a measurement that can best capture the promotion incentives of local party secretaries. To this end, I leverage cutting-edge machine learning methods—specifically, generalized kernel regularized least squares (gKRLS) and cross-fitting—by incorporating a range of factors that influence the career advancement of party secretaries, such as political leaders' personal characteristics, economic performance, and factional affiliations. The gKRLS model allows researchers to flexibly estimate the nonlinear relationships between independent variables without imposing functional form assumptions (Chang and Goplerud, 2023). Meanwhile, by splitting the dataset into multiple training and prediction sets, and iteratively training the model on different subsets while predicting on others, cross-fitting ensures that the gKRLS model produces accurate and reliable predictions for local leaders' promotion chances.

Using the career incentive index constructed above, my empirical analysis proceeds in three steps. First, by examining micro-level land transaction data and exploring the career incentives of local leaders both within and across city borders, I show that local leaders driven by strong career incentives are likely to raise land prices to further their career prospects. Specifically, I find that a one standard deviation increase in career incentives corresponds to a rise of approximately 51 RMB ($\approx$ \$7) per square meter in residential land prices.

Second, the analysis of city-level data on protests and land prices reveals that heightened career incentives among local officials are linked to an increase in protests, including violent and disruptive collective actions, with land price manipulation acting as a channel influencing citizens' behavior. A causal mediation analysis indicates that land price manipulation is responsible for 25% of the observed protests. Furthermore, utilizing data from the Chinese

Family Panel Survey (CFPS), I illustrate that distributional injustice spurs individuals to protest. Specifically, a one standard deviation increase in the compensation gap raises the likelihood of individuals who have lost land engaging in conflicts with local government officials by 3.7%. Additionally, this effect extends to individuals who, while not directly affected by land expropriation, witness such governmental infringements on property rights, leading to a 1% increase in their propensity to engage in conflict.

The results of this study contribute to the understanding of regime stability in authoritarian countries. The existing theoretical argument claims that institutionalized party systems within authoritarian regimes serve to enhance elite cohesion and reduce conflicts (Gandhi and Przeworski, 2007; Gandhi, 2008*a*; Magaloni, 2008; Svolik, 2012; Meng, 2021). These theories suggest that the formal structures and processes inherent in institutionalized systems provide mechanisms for dispute resolution and power distribution, thereby contributing to the overall stability of the regime. However, my research indicates that the institutionalization of party systems in authoritarian regimes may exacerbate conflicts between ruling elites and non-elites, posing a threat to the stability of the regime.

Second, this chapter clarifies the causal relationship between the career incentives of local officials, land prices, and adverse political outcomes. My empirical findings complement existing research on fiscal imperatives (Tao et al., 2010; Whiting, 2011; Chen and Kung, 2016), political patronage (Chen and Kung, 2019), and the role of informal institutions such as lineage groups (Mattingly, 2016) in shaping local government decisions regarding land allocation, expropriation, and urban land development. Importantly, my study connects career incentives with collective actions and highlights how distributional injustice, resulting from interventions in land pricing, acts as a mechanism for increased political conflict in China. Additionally, the empirical findings contribute to the body of literature examining the political consequences of local governments' coercive and violent land expropriations on public trust and conflicts with local authorities. By doing so, it enriches the discussion on the socio-political effects of land management practices in China (Cui et al., 2015; Sargeson, 2016; Cai et al., 2020, 2021; Sha, 2023).

Lastly, it contributes to the extensive literature on the political economy of land property rights. Existing studies document a variety of negative effects of incomplete property

rights, such as suppressing human capital (Galor, Moav and Vollrath, 2009; Albertus, Espinoza and Fort, 2020), reducing agricultural productivity and investment (Besley, 1995; Banerjee and Iyer, 2005), increasing social conflict (Heurlin, 2016; Domenech and Herreros, 2017; Albertus, 2020), and hindering economic development (Albertus et al., 2016). I illustrate how local governments can exploit the property rights gap for economic development while acknowledging that such actions can paradoxically generate political challenges that undermine long-term economic development.

2.2 Theory

In this section, I present my theoretical argument on how institutionalized promotion within a party system can provoke conflict between ruling elites and non-elites. I then examine the context of China, offering a detailed theoretical perspective on how state ownership of land, coupled with meritocratic political promotion, motivates local governments to manipulate residential land prices. Finally, I address the political repercussions resulting from such manipulations of land prices.

2.2.1 Institutionalized Party System and Regime Stability

Existing literature indicates that institutionalized party systems play a crucial role in enhancing the stability of authoritarian regimes (Gandhi and Przeworski, 2007; Geddes, Wright and Frantz, 2018). A central mechanism through which party systems contribute to regime stability is credible power-sharing among ruling elites (Magaloni, 2008; Magaloni and Kricheli, 2010; Svolik, 2012). First, an institutionalized promotion system establishes a rule-based mechanism for rewards and punishments, creating stable career expectations for party cadres (Svolik, 2012). Second, the hierarchical structure of the party system facilitates the distribution of spoils and offices, fostering a vested interest in the regime's continuity among the ruling elite (Magaloni, 2008). More importantly, institutionalized power-sharing helps mitigate commitment problems and imposes constraints on the dictator's arbitrary

actions by enabling ruling elites to initiate collective actions against dictators (Gehlbach and Keefer, 2012; Boix and Svolik, 2013). Finally, recent studies illustrate that a strong party, characterized by established rules and procedures that depersonalize its operations and limit the leader's ability to make arbitrary decisions, ensures the party achieves better governance and economic outcomes than regimes with weak parties (Bizzarro et al., 2018; Meng, 2021).

Political parties can also serve as a tool for co-opting potential rivals (De Mesquita et al., 2005; Levitsky and Way, 2010). To maintain control over politics, ruling elites strategically identify and integrate individuals, social groups, and political parties into the regime's structures (Magaloni, 2006). The distribution of economic benefits and privileges, and granting a certain degree of policy influence is the binding force between the ruling elites and potential rivals. Furthermore, the threat of withdrawing these advantages in the event of defection acts as another mechanism for securing the allegiance. By neutralizing opposition, authoritarian regimes significantly increase their internal stability and regime longevity.

Examining existing theoretical frameworks reveals a prevalent assumption: the stability of a regime is significantly influenced by the unity among its elite members. This perspective argues that political parties with rule-based and predictable criteria for the promotion of their cadres can enhance elite cohesion and generally outperform those lacking such structures. However, my theoretical argument challenges this traditional view. I argue that institutionalized promotion systems in authoritarian countries, rather than reducing conflicts, in fact, escalate conflicts between the ruling elites and the broader non-elite population, thus compromising the regime's stability.

First, the promotion mechanisms within party ranks incentivize members to breach the property rights of the masses to meet their political goals. This behavior persists, whether the promotion criteria emphasize merit or loyalty. In systems where advancement is merit-based, party officials are driven to breach the property rights of the non-elite to monopolize and extract economic resources, enhancing the ruling elites' capability to foster economic growth. Similarly, in systems that prioritize loyalty for promotions, lower-ranking officials are often compelled to mobilize resources in ways that breach the property rights of non-elites

to show their loyalty.[2]

Second, the pursuit of career advancement often motivates ruling elites to strategically align with economic elites that can assist in achieving their political and economic objectives. Such alliances often lead to the formulation of policies that disproportionately benefit these select groups at the expense of the broader population's rights and interests. For example, a government might enact regulations to control interest rates, thereby channeling financial resources toward business sectors considered essential for economic growth or political stability. This strategy strengthens the relationship between ruling elites and pivotal business sectors. However, it also imposes costs on savers and those with fixed incomes.

As a result, the violations of property rights foster resentment against the regime and heighten conflicts between the ruling elites and the non-elites, thereby reducing the regime's stability. Therefore, while a hierarchical party system with rule-based promotion of politicians might create stability within ruling elites, it inadvertently creates deeper societal divisions and unrest, challenging the premise that institutionalized promotion of party cadres in authoritarian regimes contributes to regime stability.

To support my argument, my study explores how career incentives for local party secretaries influence the allocation of residential land in China and lead to escalated conflicts between the government and citizens. I show that local party secretaries intentionally inflate the value of residential land to advance their careers. However, this strategy depends on the local government's control over land resources, resulting in land expropriation practices where the compensation provided to landowners is significantly below the market value. Such property rights violations intensify conflicts between government officials and citizens, thereby posing a threat to the regime's stability and legitimacy.[3]

[2]Numerous studies highlight that political loyalty, driven by the career incentives of local politicians, results in predatory behaviors. See Kung and Chen (2011) for research on the Great Famine in China and Rozenas and Zhukov (2019) for research on Stalin's "Terror by Hunger" in Ukraine.

[3]It's important to highlight that my theoretical proposition concerning predatory actions by local governments within the land market aligns closely with Ong (2010) depiction of "local clientelist states." However, Ong (2010) examines local clientelist states through the lens of government and business dynamics, underscoring the significant personal benefits accruing to local political leaders. In contrast, my study delves into the influence of political motivations that impel local leaders toward predatory behaviors.

2.2.2 Political Promotion in China

This section delves into China's relative performance evaluation system to demonstrate that local leaders' promotion incentives lead to negative political outcomes. It examines the rules within this system and how they create perverse incentives for local leaders.

The cadre management system reform in China is one of the most significant political reforms among all the reforms since 1978. This reform gradually institutionalizes the procedures and criteria for evaluating government officials. Through the nomenklatura, the party effectively controls politically important positions. The cadre management system serves as a political incentive mechanism to enforce the political control of upper-level governments over their subordinates and effectively transmits priorities from the top down (Manion, 1985; Huang, 1995). Moreover, the reform of the cadre management system transforms the cadre evaluation criteria from merely emphasizing political loyalty to focusing on both political loyalty and the competence of cadres (Susan et al., 2004).

Under the current Chinese political hierarchy, leaders one level up decide the political appointments of subnational leaders. Specifically, the organizational departments of upper-level governments are responsible for collecting, assessing, and storing information on local leaders. They also provide recommendations for the appointment, promotion, and transfer of local leaders to the members of the party's standing committees at the upper level (Manion, 2023).

To achieve career advancement, local leaders are evaluated based on their relative performance, which incentivizes intense competition among peers within the same jurisdiction (Li and Zhou, 2005; Xu, 2011). Among the evaluation criteria, the GDP growth target is particularly important. Prior empirical research has demonstrated that the higher the average economic growth during local leaders' tenure, the greater the likelihood of their promotion (Bo, 1996; Maskin, Qian and Xu, 2000; Landry, Lü and Duan, 2018). Moreover, the same performance evaluation system also requires local governments to actively attract investment (Bulman, 2016; Ang, 2016).

Two key institutional features play a crucial role in motivating local leaders to strive for career advancement at an early stage: the retirement age rule and term limits. The retire-

ment age rule stipulates that city-level officials are required to retire at the age of 60 (Kou and Tsai, 2014; Xi, Yao and Zhang, 2018). However, those aspiring to be promoted to the vice-provincial level must be younger than 57, as individuals older than this face significantly reduced promotion probabilities, creating a distinct "glass ceiling" (Kostka and Yu, 2015). The term limit restricts local political leaders from serving more than two terms in a single office, with each term typically lasting five years (Wang, Zhang and Zhou, 2020). Consequently, most city leaders are allowed approximately 10 years in a single position. Leaders who fail to secure higher-level promotions are often transferred to similar-level positions in different cities or assigned honorary roles within organizations such as the Chinese People's Political Consultative Conference or the People's Congress, particularly as they approach retirement age.

Consequently, the promotion system based on economic performance provides high-powered incentives for local leaders to focus on economic growth. In their pursuit of rapid growth, they often distort resource allocation, leading to adverse political outcomes.

2.2.3 Career Incentives and Land Prices

I argue that local party secretaries intentionally increase residential land prices as a means to enhance their economic performance, given the connection between economic growth and the career advancement of party secretaries. My argument is based on the following line of reasoning. Firstly, raising residential land prices can stimulate a thriving housing market, which directly contributes to local economic growth. Due to the speculative nature of the real estate market, increasing residential land prices attract more investors and developers to invest in the local economy. The heightened investment leads to new construction projects, increasing the demand for construction materials, labor, and related industries. Consequently, this fosters more job opportunities and stimulates economic growth.

Moreover, promotion incentives motivate party secretaries to increase residential land prices to strengthen local government revenue. Local governments aim to expand their revenue for two reasons. First, the fiscal reform that occurred in 1994 increased the fiscal capacity of the central government while leaving expenditure responsibilities unchanged

for local governments. The mismatch between local governments' fiscal capacities and expenditure responsibilities prompts them to exploit their land ownership to offset budgetary deficits. Second, local leaders are strongly motivated to invest in extensive infrastructure and large-scale projects to signal their competence (Chen and Kung, 2016; Lü and Landry, 2014; Henderson et al., 2022). Given that land constitutes the foremost asset for local governments and they possess complete ownership over land transfer fees, there is a tendency to increase residential land prices to finance these investments.[4]

2.2.4 Land Price Distortions and Conflicts

Rithmire (2017) demonstrates the "complementarities" role of land institutions with fiscal and financial institutions in China, which tends to favor dominant political actors while placing burdens on less powerful ones. Therefore, it is crucial to analyze the distributional consequences of land price interventions to understand the political consequences associated with such interventions.

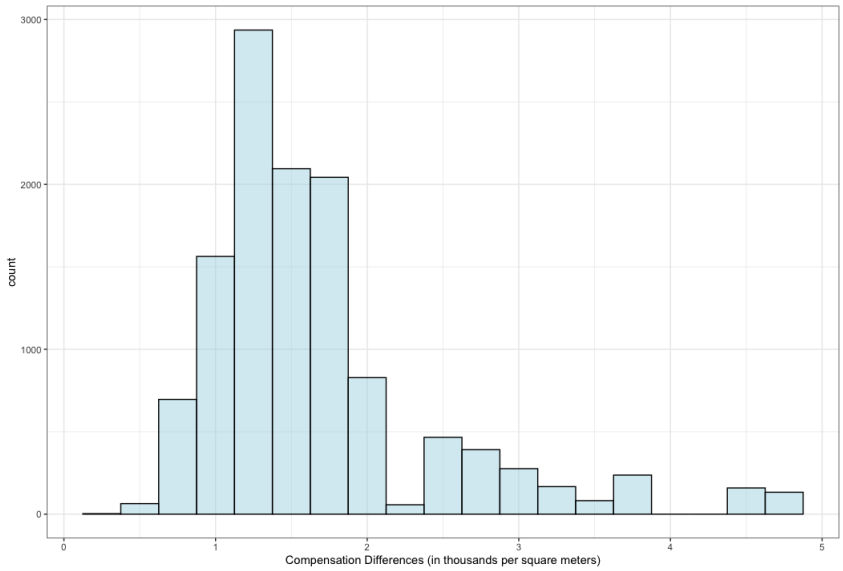
Building upon the existing literature, I argue that the pursuit of land-centered development, while benefiting local governments and gaining the support of key social groups, often undermines the property rights of citizens, particularly those with limited legal and economic resources to challenge state-led land expropriation. It is important to note that the land-centered development strategy crucially relies on the government's ability to acquire land at low costs so that they can leverage land resources not just for urban and industrial projects but also to maximize local government revenue. The consequence of this strategy is a widespread violation of citizens' property rights, often leaving them disenfranchised and poorly compensated.[5] Figure 2.1 demonstrates significant disparities between the monetary compensation received by land-losing respondents and the provincial average residential land prices using data from China Family Panel Studies. It is evident that all respondents who experienced land expropriation received compensation that was lower than provincial average

[4]Figure 2.2 illustrates that revenue generated from residential land sales constitutes the largest proportion of government income derived from land sales.

[5]Land compensation in rural areas is determined by agricultural yields in the years preceding conversion, including compensation for the loss of land, subsidies for relocation, and loss of property on the land. The compensation does not include land future values and is significantly lower than the market value; see a detailed discussion in (Cai, 2016; Cai, Liu and Wang, 2020).

residential land prices, indicating varying degrees of potential under-compensation.

Figure 2.1: Compensation Gaps Among Land-losing Citizens



Notes: Data comes from China Family Panel Studies, Wave 2010, please refer to Section 2.4 for a detailed discussion. Compensation gaps are quantified as the disparities between the monetary compensation received by land-losing respondents and the provincial average residential land prices.

I argue that the growing gap between the market values of land and the compensation provided to those who lose their land increases the risk of conflicts between citizens and local authorities for several reasons. First, this disparity evokes strong feelings of injustice and resentment towards local authorities, thereby increasing the likelihood of resistance against state-led land expropriation. Secondly, the prevalent feeling of being overlooked and marginalized in the development process erodes citizens' trust in government policies, diminishing their willingness to cooperate with governments. Finally, the lack of transparency in land expropriation intensifies perceptions of corruption within local governments. As a result, this undermines the regime's legitimacy in the public's eyes.

Furthermore, I argue that state-initiated land expropriation not only triggers conflicts with citizens directly affected but also extends to those in the same community who, though not immediately impacted, witness these grievances. Based on literature on contentious politics, this diffusion effect arises from connections such as social networks and kinship ties between citizens who have lost land and those who have not been expropriated (Zhang,

2015; Yang, 2015; Bondes and Johnson, 2017). These connections cultivate a shared sense of grievance that can mobilize more people to resist government actions. Therefore, individual-level grievances can act as a catalyst for broader social protest.

In summary, the theoretical discussion above yields the following testable hypotheses. First, local party secretaries with high career incentives tend to increase residential land prices. Second, career-seeking politicians lead to escalated collective actions regarding land issues, with land price intervention being the channel through which career incentives influence collective actions. Third, if citizens' tendency to engage in collective actions is influenced by the degree of distributive justice, then the greater the inadequacy of land compensation received by land-losing citizens, the more likely they have conflict with local authorities. Finally, the distributional injustice should also increase the inclination of citizens living in the same community to have conflict with government officials.

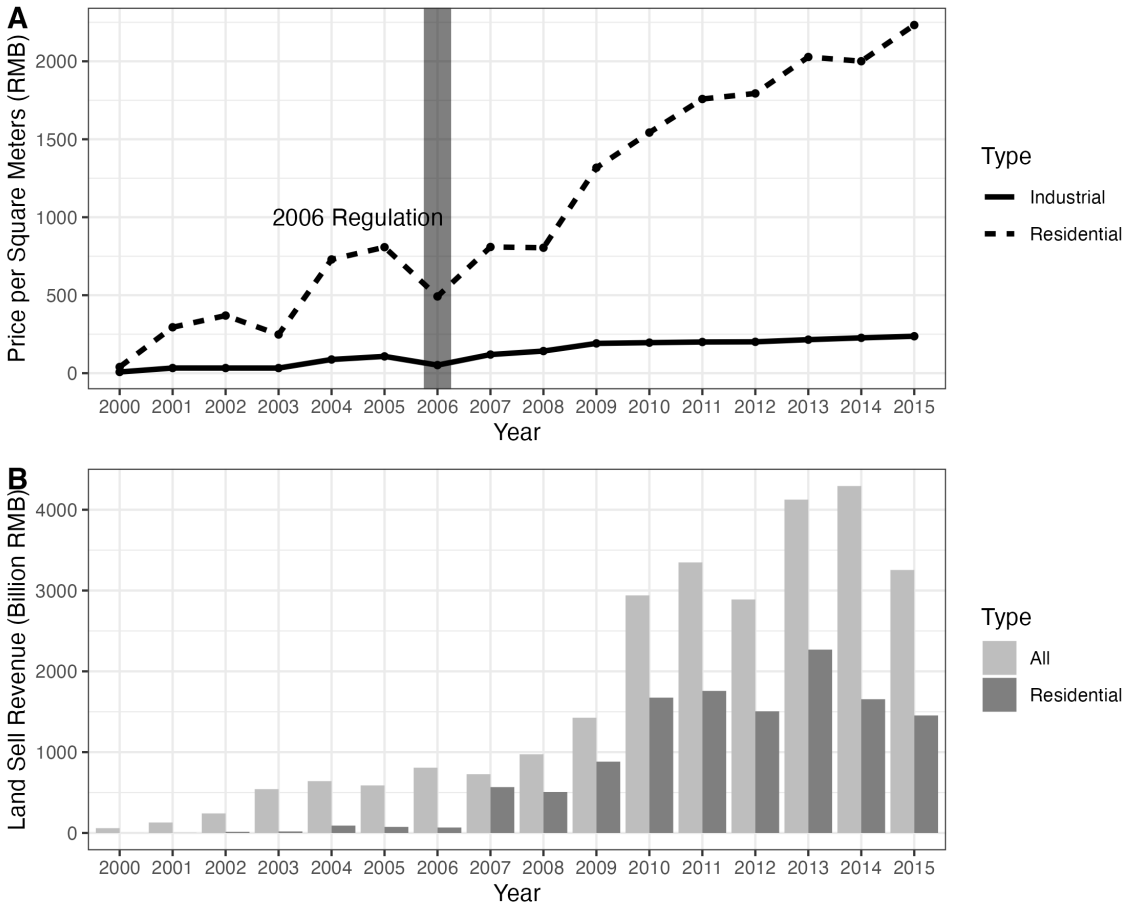
2.3 Land Market in China

In accordance with the Constitution of the People's Republic of China, urban land is designated as state-owned, while rural land falls under the ownership of the "collective." However, the economic reforms initiated in 1978 prompted the central government to respond to the financial constraints posed by urbanization and industrial development. Inspired by the practices observed in Hong Kong, a decision was made to transform land into a tradable commodity, leading to the initiation of the land market wherein land use rights could be leased to interested parties. This transformation was first piloted in the Special Economic Zones during the early 1980s and subsequently extended to all local governments after 1988 (Ding, 2003).

In 1988, an amendment to both the Constitution and the Land Administration Law by the central government introduced a separation between land use rights and land ownership. This revision preserved the state's land ownership to prevent potential political upheaval while simultaneously laying the groundwork for the establishment of a land market in China (Cheng, 2020). Local governments were conferred with a monopoly over the supply and

leasing of lands through the primary market. Individuals in the urban area are only allowed to transfer land use rights through the secondary market. Additionally, any rural lands that are intended to be sold in the primary market for urban development must first be acquired by local governments and then sold to the potential users (Ding, 2003).

Figure 2.2: Average Land Price and Land Revenue for Local Government



Notes: The figure in panel A shows the average industrial and residential land prices between 2000 and 2015. Panel B shows the total government income from land sales. Land prices are calculated based on the author's own data, and the land revenue data comes from the Chinese Statistical Year Book.

Figure 2.2 illustrates the changes in land prices for both residential and industrial sectors. The thick grey bar labeled "2006 Regulation" in Panel A indicates the central government's regulation introduced in 2006, setting minimum prices for industrial land. This regulation aimed to prevent local governments from reducing or exempting land prices to attract investments. Although it led to an increase in industrial land prices, the impact was relatively

minor. In contrast, there was a significant increase in residential land prices after 2006, making the sale of residential land a major revenue source for local governments. Panel B emphasizes the substantial revenues local governments have obtained from selling residential land; nearly half of the land sale revenues come from residential land.

2.4 Data

This chapter studies the political incentives of party secretaries in prefecture-level cities and their effect on land prices and political outcomes. To this end, I compiled a data set including 1) land transaction data, 2) local party secretaries' biographic data, 3) economic development indicators and protest data at the prefecture level, and 4) survey data on conflict with local government officials from China Family Panel Studies (CFPS).

Land Transaction Data: I obtained land transaction data from the China Land Transaction Monitoring System website.[6] It maintains records of land transactions in every locality. I web-scraped all the land transaction records between 2000 and 2020 and obtained approximately 3 million land transaction records. Each observation represents a piece of land sold by local governments. Each transaction includes the transaction price, date of transaction, land location, buyers, area of the plot, intended usage of the land, selling methods, and land quality. In this chapter, I use residential land between 2000 and 2015, totaling 600,000 observations. I then used Baidu Map API to geolocate all land transactions and calculate their distances to borders, city centers, and railway stations.

Local Leader Data: City leader biographic data came from the Chinese Political Elite Database (CPED), collected by Jiang (2018). The data includes all biographical information of prefecture party secretaries between 2000 and 2015, which was compiled from government websites, provincial and city yearbooks, and other authoritative internet sources. This biographical information records the time, places, organizations, and administrative ranks of every mayor or party secretary throughout their entire careers. Using this biographical information, I matched each person in the database with cities where they served as party

[6] https://www.landchina.com/

secretaries to construct city-person-year panel data from 2000 to 2015. Except for personal background information such as their sex and ethnicity, I also constructed variables to indicate whether they had political ties with upper-level government officials, work experience in state enterprises, or the Communist Youth League. All constructions are based on procedures from existing literature (Opper, Nee and Brehm, 2015; Jiang, 2018).

City-level Data: I also constructed a city-year panel data on prefecture-level GDP growth rate, fiscal revenue, foreign direct investment, and total population from China City's Statistical Year Book. Protest data comes from the CASM-China dataset collected by Zhang and Pan (2019), where they obtained collective actions between 2010 and 2017 in China from social media using machine learning algorithms. Their algorithm has an advantage in identifying rural and land-related protests, making it more suitable for my analysis. Based on the label they created for each protest event, I used the keywords "land" to identify all protests related to land from 2010 to 2015, and then aggregate to city-year level.

Survey Data: To evaluate how land expropriation and distributional inequality influence regime stability and legitimacy at the individual level, I use survey data from China Family Panel Studies (CFPS), a nationally representative and longitudinal dataset of Chinese communities, families, and individuals. I use four waves of data for adults spanning from 2010 to 2016, focusing on their answers to the question of "Whether you had conflicts with local government officials in the past year." Based on their response, I constructed a dummy variable with 1 means had conflicts with local government officials before and 0 otherwise.

The questions I used to construct distributional inequality measures are based on the survey conducted in 2010 at the family level; 1) whether they experienced land requisition or not, 2) the area of land requisition, and the compensation they received. If a family experienced land expropriation, all their family members will be coded as 1 across all four waves and 0 otherwise. The compensation gap is measured by the difference between the compensation land-losing respondents received per square meter and the average land market value per square meter sold by local governments in each survey year.

In total, I collected political and economic information on nearly 320 of China's 333 city-level jurisdictions. Table A1 and Table A2 in the Appendix provide summary statistics

for party secretaries, land, and survey respondents.

2.5 Measurement

In this study, the primary independent variable is the career incentives of city leaders. Guided by the methodologies outlined by Wang, Zhang and Zhou (2020) and Fang, Li and Wu (2022), I construct a career incentive index, including a range of factors that influence the career advancement of party secretaries. Existing literature identifies several key factors of political selection in China, such as political leaders' personal characteristics, economic performance, and factional affiliations (Li and Zhou, 2005; Shih, Adolph and Liu, 2012; Jia, Kudamatsu and Seim, 2015; Landry, Lü and Duan, 2018). Building on these findings, I use a set of variables to estimate the ex-ante promotion probability of city party secretaries. First, I create a dummy variable to indicate whether a party secretary is promoted in a given year based on whether that person was promoted to a vice-provincial position with an active role. These positions include vice-provincial level positions in the provincial or central government party branches, executive branches, judicial branches, state councils, the Communist Youth League, and state-owned enterprises. I, then, regress the promotion variable on several predictors: the age of the local leaders, their age at the onset of their tenure as party secretaries, educational background, prior work experience, factional connections with provincial leadership, and the average GDP growth during their incumbency. Finally, I use the estimated coefficient to predict the ex-ante promotion probability for each city leader in a given year.

To improve prediction accuracy, I employ cross-fitting——a state-of-the-art machine learning technique that is well suited for prediction tasks. The data is divided into five subsamples, with each one sequentially used to train the model while the remaining are used for prediction. This process is iteratively conducted for all five subsamples, and the predictions are then averaged to produce the final prediction. Existing literature shows that cross-fitting effectively reduces overfitting and improves prediction accuracy (Chernozhukov et al., 2018; Nie and Wager, 2021).

I utilize two statistical models to estimate the probability of promotion: the generalized kernel regularized least square (gKRLS) developed by Chang and Goplerud (2023), and a probit model. The main chapter employs the gKRLS model for constructing the promotion index due to the model's ability to mitigate the stringent functional form assumptions typically required in linear model estimations. For instance, consider the scenario where a local leader's career advancement is influenced by a combination of factors: age, factional ties, and economic performance. In traditional modeling approaches, capturing the interplay among these variables requires the inclusion of multiple interaction terms. However, the gKRLS model efficiently handles potentially complex relationships between variables by using kernel functions, which inherently account for intricate relationships among covariates without the need for specifying each interaction explicitly.

Section A.2 in the Appendix presents the marginal effects and estimated coefficients for both models, while Figure A1 in the Appendix illustrates the distribution of party secretaries' ex-ante promotion probabilities from gKRLS model.

2.6 Empirical Results

To test my theoretical argument, I follow a three-step process. First, I analyze the impact of career incentives on residential land prices and conduct several robustness checks to validate these findings. Second, I explore the extent to which career incentives influence local protest events through land price manipulation by employing causal mediation analysis. Lastly, I utilize survey data to show that distributional injustice plays a significant role in shaping citizens' likelihood of engaging in conflicts with local officials.

2.6.1 Career Incentives and Land Prices

I use the following model to identify the effect of career incentives on residential land prices.

$$p_{ilt} = \beta_1 \mathit{Career\ Incentives}_{slt} + \Theta X_{ilt} + \alpha_l + \gamma_t + \delta_s + \epsilon_{ict} \tag{2.1}$$

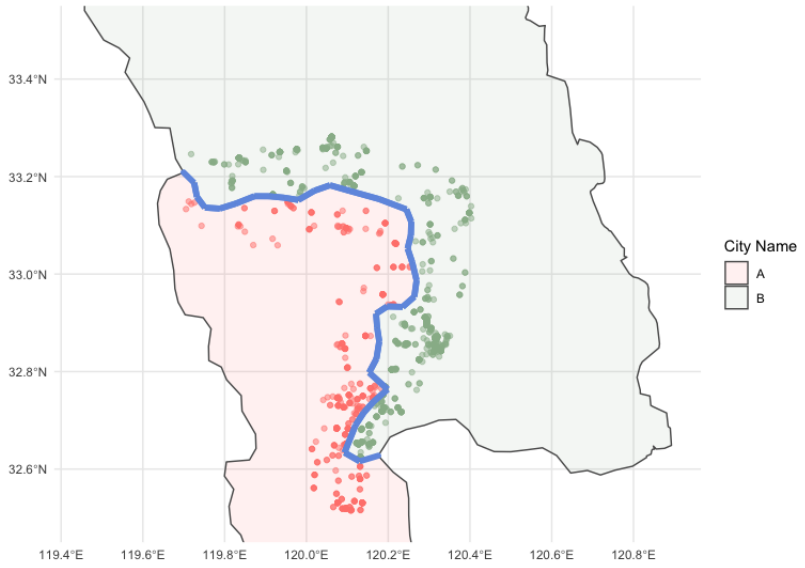
Where p_{ilt} is the price for land i in the location l sold in time t. *Career Incentives*$_{slt}$ is the career incentive for the part secreatry s in the location l. X_{ilt} is a vector of land-level control variables, including land distance to city centers and railway stations, nightlight density 1km around the land, land quality, auction methods used to sell the parcel, and land sources.[7] Land quality and distance to city and rail stations are time-invariant factors that decide the intrinsic value of the land. Nightlight density and population around 1km of the land are used as proxies for economic development. Land-selling methods are used to control market forces. Adding parcel-level control variables helps to reduce the estimation biases due to the plot-level heterogeneity.

To address leader-specific and time-specific heterogeneity in the analysis, I incorporate leader fixed effects, denoted as δ_s, and quarter fixed effects, represented by γ_t. I investigate variations in land prices both within individual cities and across city borders by using different fixed effects, α_l. Specifically, by applying city-level fixed effects, the analysis focuses on how changes in land prices are associated with variations in the career incentives of local leaders within the same city. Alternatively, when adopting border fixed effects, the analysis is confined to cities that share common borders, allowing for the investigation of land price variations attributable to differences in promotion chances across adjacent cities. Accordingly, standard errors are clustered at the city level for models analyzing within-city variations, and at the border level for models assessing cross-border variations.

One challenge of leveraging cross-border variation is the potential biases stemming from heterogeneity at the city and land level. The price of a particular piece of land is influenced by various factors, including its location, the quality of infrastructure and amenities, as well as demographic characteristics. Building upon previous studies on estimating the effects of land regulations across borders (Bayer, Ferreira and McMillan, 2007; Turner, Haughwout and Van Der Klaauw, 2014), I use land transactions across city borders to reduce the bias due to the land- and city-level heterogeneity. I use Figures 2.3 to demonstrate my rationale. Suppose

[7]Land quality, assessed by the local government, is an overall evaluation of a parcel of land based on the area's economic prosperity, population density, traffic conditions, and infrastructure conditions. According to the Land Resources Bureau's criteria, there are fifteen levels of land quality. Level one represents the highest land quality, such as land in Shanghai and Beijing's central business district, whereas level fifteen represents the lowest land quality. Land sources refer to whether the land is converted into farmland or comes from existing constructed land.

Figure 2.3: Data for Identifying Promotion and Competition Effects



Notes: This figure is a visualization of the identification strategy for controlling for land-level heterogeneity.

two cities, A and B, are divided by a border. If I restrict the data to land transactions that cross borders, it ensures that land characteristics, economic conditions, and demographic factors are approximately identical.

Table 2.1 reports results based on the above identification strategy. Columns (1), (3), and (5) offer estimations without adding any land-level controls, while columns (2), (4), and (6) include a full set of control variables. In addition, columns (3) and (4) show cross-border estimations using all data, whereas columns (5) and (6) focus on data limited to areas within 8km of borders. The career incentive index is standardized, allowing the interpretation of coefficients as the impact of a one standard deviation increase in the career incentives of local political leaders on residential land prices. The results from column (1) indicate that a one standard deviation rise in career incentive corresponds to an increase of 46 RMB per square meter in residential land prices. With the inclusion of all control variables, this effect increases to 51 RMB ($\approx$ \$7) per square meter. It's important to note that the within-city coefficients reflect the impact of career incentives for the same party secretaries within

Table 2.1: Career Incentive on Land Prices

	Within-city		Cross-border			
					Distance <= 8km	
	(1)	(2)	(3)	(4)	(5)	(6)
Career incentive	45.934***	51.081***	34.444***	38.662***	28.874***	33.263***
	(11.742)	(10.747)	(7.671)	(7.338)	(10.821)	(10.817)
Dep. var. mean	907.24	907.40	907.26	907.41	835.33	835.33
# of observations	466751	466601	466733	466584	103649	103647
Adjusted R^2	0.38	0.40	0.41	0.43	0.43	0.44
# of Borders	-	-	-	786	694	694
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Leader FE	Yes	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	No	No	No
Border pair FE	No	No	No	Yes	Yes	Yes
Controls	No	Yes	No	Yes	No	Yes

Note:

[1] Control variables include land quality evaluated by the local government's land bureau, land auction methods (English auction, two-stage auction, invited bidding), land distance to railway stations, distance to the city center, population density, and night light density.

[2] Standard errors clustered by cities for within-city estimations and by borders for cross-border estimations. *p<.10; **p<.05; ***p<.01.

the same city. Columns (3) through (6) utilize cross-border variations in career incentives among different leaders in different cities. The findings are consistent with the within-city estimations, albeit slightly lower. For instance, the model in column (4), which includes all control variables, shows that a one standard deviation increase in career incentive leads to a 39 RMB ($\approx$ \$6) per square meter rise in land prices. The results in columns (5) and (6), which use data from areas within 8km of the border to further minimize biases originating from city and land-level heterogeneity, provide approximately the same estimations as those in column (4). Overall, all results indicate that city-level party secretaries intend to inflate residential land prices when their career incentives increase.

2.6.2 Alternative Explanations and Robustness Checks

Alternative Explanations: Local leaders' propensity for rent-seeking behavior may lead them to manipulate land prices. Existing research highlights that one way local leaders can benefit personally is by choosing less transparent auction methods to sell land to preferred companies and obtain personal gain from the companies (Cai, Henderson and Zhang, 2013; Chang, 2023). Consequently, if corruption is the primary driver behind land price manipulation, it would be expected that local leaders are more inclined to select less transparent auction methods. Table A4 in section A.3 of the Appendix provides results regarding the impact of career incentives on the selection of auction methods. The results indicate that local leaders with higher career incentives are more likely to select transparent auction methods, indicating that rent-seeking is not a plausible explanation.

An alternative hypothesis could be that upper-level leaders strategically place local leaders in areas with rich land resources, enabling them to manipulate land prices. However, this concern is mitigated by the within-city research design, which focuses on the effects of career incentives for the leaders within the same city. The literature also points out that local governments' fiscal deficits and their capacity to attract foreign investment are significant factors in land price manipulation (Whiting, 2011; Gyourko et al., 2022; Rithmire, 2015). To address these issues, I have included local governments' fiscal gaps and the total Foreign Direct Investment (FDI) received as control variables in my analysis. The results of this are detailed in the Appendix section A.3.1. In summary, the collective evidence from these robustness checks indicates that the main findings remain consistent.

Robustness Checks: I also conduct several robustness checks. First, the career incentive index is reconstructed using predictions from a probit model to estimate the effects of career incentives, with results detailed in Appendix Table A6. Second, acknowledging that land policies and the availability of land across cities could influence both politicians' career incentives and land prices, land supply is included as a control variable in the analyses. The outcomes are available in Appendix A.3.1. Lastly, a permutation test was employed as a placebo test to verify the effects of career incentives. The procedures and outcomes of this test are documented in the Appendix section A.3.3. In summary, the results from these

robustness checks are consistent with findings in Table 2.1.

2.6.3 Career Incentives and Protest

This section explores the role of land price manipulation as a mediator in the relationship between career incentives and the frequency of protests. The unit of analysis in this study is city because protest data are aggregated at the city level. Employing the mediation analysis framework by Imai, Keele and Tingley (2010), this study examines to what degree the impact of career incentives on protests is channeled through changes in residential land prices. The analytical approach consists of two parts: a mediator model that assesses the connection between the career incentives of local leaders and residential land prices at the city level, and an outcome model that looks at how both land prices and career incentives affect the number of protests. This approach facilitates the separation of the total effect of career incentives on protests into two components: the direct influence of career incentives on protests, and the indirect influence mediated through changes in land prices. The specifications for the mediator and outcome models are as follows:

Mediator model:

$$Land\ Prices_{ct} = \beta_1 Career\ Incentive_{sct} + \Theta X_{ct} + \alpha_p + \gamma_t + \epsilon_{ct} \tag{2.2}$$

Outcome model:

$$Protest_{ct} = \beta_2 Land\ Prices_{ct} + \beta_3 Career\ Incentive_{sct} + \Omega X_{ct} + \alpha_p + \gamma_t + \epsilon_{ct} \tag{2.3}$$

$Land\ Prices_{ct}$ denotes the residential land price in city c during year t. $Career\ Incentive_{sct}$ represents the standardized career incentive index for party secretary s in city c at year t. $Protest_{ct}$ refers to the number of protests in city c during year t. I analyze two categories of protests: the total number of protests and those specifically related to land issues. To demonstrate that protests pose real threats to regime stability, I further distinguish within each category between violent protests and disruptive protests, as classified by Zhang and Pan

(2019).[8] X_{ct} is a vector of covariates, including GDP per capita, total FDI, and fiscal deficit of local governments. α_p and γ_t represent fixed effects for province and time, respectively.

Table 2.2: Career Incentives, Land Prices, and Protest

	Mediator Model	Outcome Model					
		Protest			Land Protest		
	Land Price	Total	Violence	Disruptive	Total	Violence	Disruptive
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Land price		21.701***	7.631***	6.228***	12.526***	5.394***	2.798***
		(2.989)	(1.026)	(0.786)	(1.592)	(0.742)	(0.333)
Career incentive	81.056**	5.089***	1.825***	1.394***	2.490**	1.497***	0.836***
	(34.933)	(1.811)	(0.647)	(0.468)	(0.991)	(0.512)	(0.243)
Observations	1,205	1,205	1,205	1,205	1,205	1,205	1,205
Adjusted R^2	0.469	0.481	0.404	0.402	0.451	0.379	0.372
Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

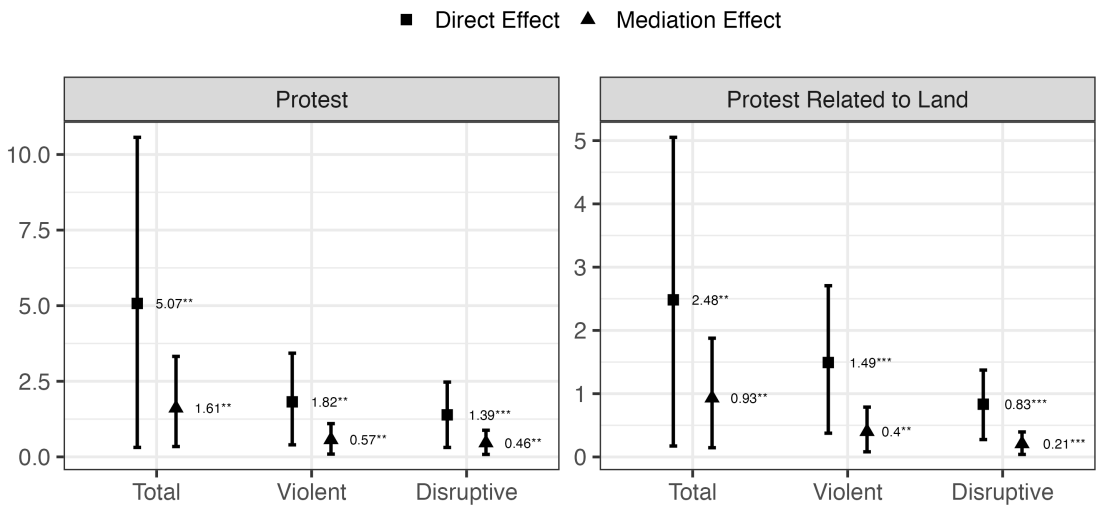
Note:
[1] City-level controls include GDP per capita, FDI, and fiscal deficit.
[2] Standard errors clustered by cities in parenthesis. *p<.10; **p<.05; ***p<.01.

Table 2.2 displays the estimation results from the mediator and outcome models. The coefficient in the mediator model indicates that a one standard deviation increase in career incentives results in an 81 RMB (≈ $12) per square meter increase in residential land prices, which is consistent with the findings from the previous section. The coefficients for career incentives in outcome models can be interpreted as the direct effect of local leaders' career incentives on protests since they controlled for the mediator. For instance, the findings in columns (3) and (4) suggest that a one standard deviation increase in career incentives has a direct effect of 1.8 and 1.4 on violent and disruptive protests, respectively.

Next, I perform a causal mediation analysis to distinguish between the average direct effect and the average causal mediation effect. This analysis requires selecting values for the

[8]Violent protests include armed attacks and physical conflicts with government officials, while disruptive protests encompass actions such as occupation of buildings, occupation of land, construction of barricades, and cutting off power supplies.

Figure 2.4: Direct and Mediation Effects



control and treatment conditions. In this study, I select the 25th percentile and the 90th percentile of the career incentive index as the control and treatment values, respectively. Figure 2.4 visually presents the results of this analysis. To determine the total effect of career incentives, one must sum the direct effect and the mediation effect. For violent protests, the results indicate that the average direct effect of career incentive is 1.82, while the mediation effect through land price manipulation is 0.6. This implies that approximately 24% of violent protests are mediated through land price manipulation. A similar proportion of the mediation effect, around 25%, is observed in disruptive protests. When applying this calculation to violent and disruptive protests related to land, the results show that 21% and 20% of the effects of career incentives, respectively, are mediated through changes in land prices. Overall, the mediation analysis reveals that local leaders' career incentives lead to increased collective actions in China, and crucially, land price manipulation serves as one of the mechanisms through which career incentives influence the outbreak of protests.

When calculating the effect of causal mediation, the key presumption is sequential ignorability. This assumption consists of two parts: first, the treatment assignment is assumed

to be independent of both potential outcomes and mediators once observed pre-treatment confounders are accounted for. Second, it posits that the mediator is independent of the outcomes, conditional on the observed treatment and pre-treatment confounders (Imai, Keele and Tingley, 2010). In randomized control trials, where the assignment of treatments and mediators is independent of the outcomes, the sequential ignorability assumption is valid.

However, in observational studies, this assumption is likely to be violated. In the above analysis, although I have included fiscal deficit—a factor known to influence both local leaders' career incentives and land prices—in both the mediator and outcome models, there may still be some personal-level confounders. For instance, local party secretaries may have unobserved political connections with high-profile provincial or central political leaders. This situation could lead them to have higher career incentives and more ability to influence land prices. If this is the case, then the first part of the assumption would be violated.

Given that the sequential ignorability assumption cannot be verified using observational data, I have conducted several sensitivity analyses following Imai et al. (2011) suggestions. These analyses quantify the extent to which the assumption must be violated for the results presented in Figure 2.4 to be reversed. The Appendix section A.4 details the procedures for sensitivity analysis.

2.6.4 Effects of Compensation Gap on Conflict

The empirical findings presented thus far establish a causal relationship between career incentives, land prices, and protests. However, the specific mechanism by which land price manipulations affect individuals' decisions to protest remains less clear. As discussed in the section 2.2.4, one key issue is the inadequate compensation provided by local governments to citizens during land expropriation. This occurs despite the fact that governments sell land at high prices, resulting in significant rent disparities between the government and the citizens. Such distributional injustice heightens local citizens' resentment towards local authorities, often leading to conflicts with officials. To investigate this distributional injustice mechanism, I utilize survey data from the CFPS. More specifically, I employ the following model to assess the impact of under-compensation on the likelihood of citizens engaging in

conflicts with local officials:

$$\text{Conflict}_{it} = \beta_1 \text{Compensation Gap}_{it} + \Theta X_{it} + \alpha_i + \gamma_t + \epsilon_{it} \tag{2.4}$$

The political outcomes for the person i at year t are constructed based on survey questions discussed in Section 2.4. The compensation gap is measured by the difference between land-losing respondents' compensation and provincial average residential land prices in a given year.[9] It is important to note that the compensation question was only asked in the 2010 survey. Therefore, I leverage two variations in the compensation gap variable. The first variation is compensation differences across families. The second is the variation in residential land prices across provincal-years. The assumption is that respondents can infer the compensation gap based on residential land prices, and the higher the land prices, the wider the gap they perceive.[10] X_{it} is a vector of time-varying variables for respondents. Finally, I add α_i and γ_t as fixed effects to control for individual-level and time specific heterogeneity. All standard errors are clustered at the family level.

Table 2.3 displays the results. The independent variable is standardized, so the coefficients should be interpreted as the effect of a one standard deviation increase in the compensation gap on the probability of survey respondents engaging in conflicts with local government officials. Column (1) presents the baseline model, which includes only individual and village fixed effects and no control variables. It indicates that a one standard deviation increase in the compensation gap raises the probability of individuals having conflicts with local government officials by 3.7%. In Column (2), I incorporate several individual-level control variables that could affect the likelihood of conflict, such as gender, age, college degree, house ownership, and income level. The result increases slightly to 4.2%, higher than the model without controls. Column (3) further adds time fixed effects to account for any time-invariant heterogeneity, and the result remains relatively unchanged. It is noteworthy

[9]Due to data usage policy, the China Family Panel Studies only allows users to identify respondents' addresses at the provincial level.

[10]This assumption is supported by the fact that the main reason for violence during land expropriation is the potential financial gain from urban development (Sargeson, 2016). Employing a similar methodological approach, Cai et al. (2020) conducted a study that used the difference between housing prices and compensation as a measure for compensation gaps to examine peasants' opposition to land expropriation.

Table 2.3: Effects of Compensation Gap on Conflict

	(1)	(2)	(3)	(4)
Compensation Gap	0.037**	0.042**	0.045**	0.045**
	(0.017)	(0.018)	(0.018)	(0.019)
Dep. var. mean	0.096	0.099	0.099	0.099
# of observations	9483	8492	8492	8492
Adjusted R^2	0.140	0.127	0.133	0.133
Individual fixed effects	Yes	Yes	Yes	Yes
Village FE	Yes	Yes	Yes	Yes
Individual Controls	No	Yes	Yes	Yes
Time FE	No	No	Yes	Yes

Note:
[1] Individual level controls include gender, age, college degree, employment status in the government sector, membership in the Chinese Communist Party, living in rural or urban, and homeowner status.
[2] Standard errors clustered by households in parenthesis. *p<.10; **p<.05; ***p<.01.

that the average probability of having a conflict with government officials in the entire sample, which includes respondents who have and have not experienced land expropriation, is 8%. The estimations presented in Columns (1) to (3) suggest that a one standard deviation increase in the compensation gap increases the incidence of experiencing conflicts with government officials by approximately 50%.

Several confounding variables may impact the respondent's compensation gap and the probability of engaging in conflicts with government officials. According to existing literature, factors such as membership in the Chinese Communist Party, representation in local and national congresses, and employment in government sectors can provide individuals and firms' some degree of legal protection against state intrusion (Dickson, 2007; Li et al., 2008; Ang and Jia, 2014; Hou, 2019). In the context of this study, such factors might reduce the

probability of receiving insufficient compensation and lower the likelihood of conflicts with government officials. To account for these factors, the model in column (4) includes variables for party membership and government employment as additional control variables. However, the coefficient associated with the compensation gap remains positive and statistically significant.

2.6.5 Spillover Effects

Lastly, it is important to investigate whether individuals who have been under-compensated can influence respondents who have not experienced such events. This exploration is crucial because if the spillover effect is significant, it increases the likelihood that an isolated land expropriation conflict could escalate into collective actions against government intrusion. To examine this possibility, I aggregate the instances of under-compensation at the village level, using this as a measure of the intensity of exposure to under-compensation for those respondents who, although not directly expropriated, reside in the same village. This approach aims to capture the broader impact of under-compensation within a community and its potential to incite collective dissent. The statistical model employed for this analysis is the same as that outlined in equation 2.4.

The results are presented in Table 2.4. In Column (1), the results are reported with individual fixed effects and without control variables. Column (2) incorporates individual-level control variables, while Column (3) includes time fixed effects. Lastly, Column (4) adds county fixed effects to address any county-level heterogeneity. The results across these specifications are almost identical, indicating that a one standard deviation increase in exposure to under-compensation enhances an individual's likelihood of engaging in conflicts with government officials by 1%. Considering that the sample mean is approximately 8%, this suggests that exposure to under-compensation increases the likelihood of non-expropriated individuals engaging in conflicts with government officials by 13%. This significant increase underscores the potential for isolated incidents of land expropriation to escalate into more widespread collective actions against government authorities.

In summary, the estimates shown in Table 2.3 and 2.4 indicate that distributional in-

Table 2.4: Spillover Effects of Compensation Gap on Conflict

	(1)	(2)	(3)	(4)
Compensation Gap	0.008***	0.010***	0.010***	0.011***
	(0.003)	(0.003)	(0.003)	(0.003)
Dep. var. mean	0.074	0.077	0.077	0.077
# of observations	84475	76114	76114	75802
Adjusted R^2	0.115	0.120	0.125	0.125
Individual fixed effects	Yes	Yes	Yes	Yes
County FE	No	No	No	Yes
Individual Controls	No	Yes	Yes	Yes
Time FE	No	No	Yes	Yes

Note:
[1] Individual level controls include gender, age, college degree, employment status in the government sector, membership in the Chinese Communist Party, living in rural or urban, and homeowner status.
[2] Standard errors clustered by households in parenthesis. *p<.10; **p<.05; ***p<.01.

justice is a crucial mechanism prompting individuals to engage in conflicts with government officials. The Appendix section A.5 offers two additional sets of results concerning the impact of the compensation gap on trust in and evaluation of local government. Results are consistent with the theoretical argument. Furthermore, I perform a placebo test on outcome variables that should not be influenced by the compensation gap to assess the robustness of the results. Results are shown in Table A8. I observed no effects of the compensation gap on these two outcome variables, indicating that the observed effects in conflict are likely not due to spurious correlations.

2.7 Conclusion

This chapter demonstrates that institutionalized promotion within a party system in an authoritarian regime can increase conflicts between ruling elites and non-elites, thereby reducing regime stability. I argue that the career incentives of politicians within party systems incentivize violations of non-elite property rights, escalating conflicts between governments and citizens. By combining data from residential land transactions and career records of local politicians, I demonstrate that politicians with high career incentives tend to mobilize state-owned resources to accomplish their political goals. However, such a strategy hinges on amassing enough resources,thereby incentivizing local leaders to violate the property rights of non-elites. Using prefectural-level land price data and protest data, I show that career-seeking politicians contribute to heightened collective action on land issues, with land price intervention serving as the channel through which career incentives impact collective actions. Finally, evidence based on multiple national surveys indicates that distributional injustice acts as a pivotal factor driving conflicts between citizens and governments.

What is the equilibrium outcome of land price interventions on economics and politics? Moreover, how should local governments achieve a delicate balance between benefits and costs? Addressing these questions extends beyond the scope of this chapter. However, considering all the evidence from this chapter and existing literature, it seems that the current political promotion system has begun to impede political development despite its initial contribution to economic development.

3.0 Good Friends versus Best Friends: How Different Types of Political Connection Work in China

3.1 Introduction

Connections between businesses and politicians are widespread in most countries.[11] A growing body of literature has explored how such connections positively affect firms' performance in both developed and emerging economies (Faccio, 2006; Ovtchinnikov and Pantaleoni, 2012; Truex, 2014; Schoenherr, 2019; Acemoglu et al., 2016), as well as how they can adversely affect firms' value (Fisman, 2001; Chen et al., 2011; Fisman and Wang, 2014; He, Wan and Zhou, 2014; Bertrand et al., 2018) and social welfare (Fisman and Wang, 2015; Jia and Nie, 2017). Despite the fact that political connections have critical implications for political governance, corruption, and social welfare, it remains unclear how firms benefit from them. This chapter leverages publicly listed firms' different types of political connections to disentangle their impact on land purchases and the mechanisms by which they operate.

By studying the value of political connections in China's land market, I make two significant contributions to the literature. First, I construct a comprehensive and diverse set of political connection measurements for all publicly listed companies in China between 2010 and 2017 to disentangle the different mechanisms. I use general political connections (GPCs) when firms have high-profile government officials as board members (the reputation mechanism). Furthermore, I construct locality-specific political connections (LPCs) to capture firms' connections with high-profile local authorities (the influencing politics mechanism) and local experience (LE) to reflect firms' information advantage (the access to information mechanism). Additionally, I use firms' executives or board members who are delegates of the local People's Congress (PC) or the Chinese People's Political Consultative Conference (CPPCC) as measures for firms' institutional embeddedness.

The second key contribution is demonstrating that political connections differ not only

[11]This chapter has been published in the Journal of Political Institutions and Political Economy. The final version of this publication can be accessed through Now Publishers at http://dx.doi.org/10.1561/113.00000078.

in their impact but also in the mechanisms through which they operate. I document how distinct types of political connections influence the size of benefits that firms obtain before and during land auctions, thereby causing differences in the overall values derived from these connections. Four auction methods can allocate a piece of state-owned land to the private sector in China: English auction, two-stage auction, invited bidding, and bilateral agreement. It is important to note that the English auction method is the most transparent, while the last two are the least. Therefore, the latter two auction methods are more likely to be subject to collusion.

As public land sales in China are managed by local governments, I expect that firms with local political ties can directly influence land reserve prices before the auctions and limit the level of competition during the auctions. This enables them to obtain greater land price discounts than firms with other types of connections. General political connections (GPCs) enhance firms' reputations and ensure that firms are credible partners in working with governments. Thus, a good reputation helps connected firms to face fewer competitors during land auctions. However, they have limited ability to influence land reserve prices before auctions. Institutional embeddedness and access to local information reduce information asymmetry when firms deal with government agencies. Therefore, I expect these types of connections to help firms secure some land price discounts.

The study proceeds in three steps. First, I examine the overall effect of political connections on land prices by controlling for land characteristics, firm, and city fixed effects. Second, I document how firms benefit from political connections by entering into different auctions, pairing land transaction data with the corresponding auction records. Finally, I demonstrate that political connections differ in their effects on land reserve prices and the level of competition during auctions.

Empirically, I find that firms' four types of political connections lead to varying reductions in land prices. Specifically, firms with LPCs enjoy a 31% land price discount, whereas firms with GPCs result in a 13% reduction in land prices. Firms with access to local information secure a discount of approximately 11%. However, I find no evidence suggesting that being a delegate of the PC and the CPPCC helps firms obtain land price discounts. These empirical findings remain consistent with the addition of other connection measurements and control

variables, and multiple robustness checks further confirm my findings.

I also find that distinct political connections work through different mechanisms to influence the final land prices. I first show that the least transparent auctions—invited bidding and bilateral agreement—lead to substantially higher land price discounts than two-stage auctions; the former is approximately 56%, whereas the latter is just 28%. Then, I demonstrate that firms with LPCs are 8% more likely to enter into the least transparent auctions, whereas those with GPCs are 10% more likely to enter into two-stage auctions. Moreover, I find that firms with LPCs pay land reserve prices that are 36% lower, on average, than those paid by unconnected firms, yet firms with GPCs have no such effect. Meanwhile, statistical evidence implies that both LPCs and GPCs face fewer potential buyers during land auctions. All the empirical evidence suggests that the different impacts of LPCs and GPCs are caused by the varying degrees of favorable treatment they receive before and during auctions.

Finally, I conduct an event study to explore the reactions of firms' stock market returns surrounding the abrupt arrest of political leaders in prefectures where firms have local political connections. I find that when firms lose their connections, they experience an overall 2% negative abnormal stock market return on the event date and an overall 3% negative abnormal stock market return within 10 days. These results are also robust to multiple robustness checks.

My findings relate to three separate streams of literature. First, this chapter directly addresses studies on political connections in China.[12] The work most closely related to this chapter is Chen and Kung (2018), which examined how land discounts and political promotion are influenced by firms' connections with Politburo members. The major contribution of this chapter is to provide insights into the effects of different types of political connections on the economic benefits firms can obtain.

Second, my results offer broader implications for understanding how firms benefit from political connections. Previous studies have demonstrated the benefits that politically connected firms can obtain, such as government contracts (Goldman, Rocholl and So, 2013;

[12]For example, Truex (2014) and Wang (2017) find that firms can obtain significant economic benefits if they are connected to national-level politicians, while Kung and Ma (2018) and Hou (2019) show how firms connected to certain formal institutions, such as China's National People's Congress, or those with friends working in governments, can more easily access economic resources and protect their property rights.

Schoenherr, 2019), capital investment and subsidies (Fisman, 2001; Qin, 2013; Acemoglu et al., 2016), and circumventing government regulations (Faccio, Masulis and McConnell, 2006; Fisman and Wang, 2015). This chapter further documents the mechanisms through which firms benefit from political connections.

Third, this chapter also contributes to the broader theoretical context highlighted in the existing literature on auction mechanisms and the effect of collusion on auction outcomes. In contrast to previous studies that consider the welfare implications of different auction methods (Bajari and Ye, 2003; Athey, Levin and Seira, 2011), or those that examine the effects of collusion between auctioneers and bidders on auction outcomes (McAfee and McMillan, 1992; Burguet and Che, 2004; Lengwiler and Wolfstetter, 2010), this chapter emphasizes the effects of strategic selection of auction types on rent provision. Several studies present conceptual frameworks and empirical evidence of strategic selection and corruption in China's land market (Cai, Henderson and Zhang, 2013; Wang and Hui, 2017). However, these studies are based on either limited samples or city-level aggregate data. By contrast, this chapter provides nationwide and transaction-level evidence on the selection of auction types and the impact of such selection on the value of political connections.

3.2 Theory and Hypotheses

Private firms have multiple options available to them when they enter politics. They can indirectly influence politics by making campaign contributions or lobbying politicians to advance their business interests. Alternatively, they can directly involve themselves in politics; for example, board members or senior executives can run for public offices or hire current or former politicians to join their boards of directors.

Distinct types of political connections have different effects on the extent of economic benefits firms can obtain. An example is the comparison between a firm that uses politicians to represent its interests and a firm whose owners directly run for office. Businesspeople in office directly represent and advance their firms' interests, ensuring that government policies do not detrimentally affect their operations (Szakonyi, 2018). Such political connections

should provide more economic benefits than the former type because there is no guarantee that a connected politician will advance one particular firm's interests.

Furthermore, distinct types of political connections also imply different mechanisms through which firms can benefit from such connections. In this chapter, I propose four mechanisms that help connected firms leverage political power and obtain economic benefits when purchasing land from Chinese local governments.

3.2.1 Different Types of Political Connection

Reputation. When firms have executives or board members who are current or former government officials, it sends a strong signal of good government relationships (Truex, 2014). The existing literature demonstrates that connected firms can access financial resources more easily (Cull et al., 2015), obtain more preferential tax treatment (Feng, Johansson and Zhang, 2015), and receive more government subsidies (Li, 2022). In particular, when firms in highly regulated industries have political connections with regulators, such relationships enable them to navigate regulations more easily and conduct business in regulated industries (Feng, Johansson and Zhang, 2015). Consequently, connected firms outperform their non-connected counterparts.

When Chinese local governments sell land to firms, they must ensure that these firms possess the ability to obtain the necessary licenses to conduct their proposed business, are able to pay the land conveyance fee, and have sufficient funds to complete the project for which the land is assigned. When local governments observe that firms have connections with government officials—especially high-profile ones—they interpret these connections as strong credibility signals, suggesting that they are highly likely to meet all requirements. Therefore, to reach mutual benefits and ensure connected firms can obtain the land they seek, local governments are incentivized to lower the requirements for such buyers, such as by reducing security deposits or limiting the number of potential buyers during land auction stages.

Influencing Politics. Connected firms can also directly influence government officials to bend rules, regulations, and even laws in their favor. Such preferential treatment typically

involves collusion and corruption between firms and government officials (Jia and Nie, 2017).

The political influencing mechanism tends to operate through this channel in China's land market because the current land management institutions facilitate and even incentivize corruption among local elites. Before 1988, land was allocated according to the central government's overall land resource plans. However, after 1988, local governments were granted *de facto* authority to sell state-owned lands to private companies or individuals in China. This change in regulation, combined with the ambiguity of land ownership, created an incentive for politicians to increase their personal incomes at the expense of public welfare.

However, generating lucrative profits from manipulating land prices cannot be conducted by one government official or within a single bureau, because the division of bureaucratic authority allows each politician or bureau to control only a portion of the land-selling process (Pei, 2016). Indeed, buying land from a local government requires firms to apply for permits through the local Land and Resources Bureau, Environmental Protection Bureau, Transportation Bureau, and many other relevant local bureaus.[13] A firm may choose either to build connections with low-level bureaucrats in each of these bureaus or to pursue connections with local high-profile political leaders, such as local government's (vice) party secretaries, (vice) mayors, and (vice) deputies of the local people's congress.[14] The former option entails paying each low-level bureaucrat independently to obtain favorable treatment, whereas the latter involves only compensating the top leaders, who in turn leverage their network to assist firms. This means firms have strong incentives to build connections with top local leaders.

By connecting with local high-profile politicians, firms gain a competitive advantage in obtaining key economic resources that would be difficult or costly for other firms to acquire, thereby reducing connected firms' production costs. In the context of this study, the value of political connections comes in the form of land discounts obtained by connected firms when purchasing land from local governments.[15]

[13]Beginning in 2018, the Ministry of Land and Resources merged with the Ministry of Natural Resources.

[14]Generally referred to as "四套领导班子" in Chinese studies.

[15]I am interested in the impact of changes in firms' political status on political rents. Therefore, I leave the question of when (and which types of) firms choose to appoint prior politicians to their boards for future studies.

Access to Information. Nevertheless, firms may still be incentivized to build good relationships with low-level bureaucrats, as these connections can also help firms navigate new and complex institutions (Michelson, 2007). As demonstrated above, purchasing land from governments requires licenses and permits from different government bureaus. Connecting with low-rank government officials provides firms with a channel for accessing knowledge about how governments operate in specific bureaus and localities.

This knowledge helps firms navigate between state agencies and improves their understanding of state bureaucrats' intentions. Ang and Jia (2014) demonstrate that having an information advantage ("know-how") increases firms' likelihood of using formal legal institutions when dealing with China's legal system. In this chapter, I argue that building connections with low-ranking bureaucrats helps firms familiarize themselves with local economic policies, land-buying procedures, and other information that would be harder for unconnected firms to obtain. Consequently, this type of connection helps firms obtain cheaper land.

Institutional Embeddedness. The last mechanism involves firms' directors or board members serving as delegates of the PC or the CPPCC. Existing literature demonstrates that legislatures in authoritarian countries are not merely "window dressing" or "rubber stamp" institutions. Rather, they serve as instruments for power-sharing, reducing information asymmetry, and solving commitment problems (Gandhi, 2008*b*; Svolik, 2012). The PC and the CPPCC provide businesspeople with channels through which they can express their concerns and suggestions and help governments collect useful information.

I define these types of political connections as "institutional embeddedness" because this represents a formal way for businesspeople to participate directly in politics in China. However, this does not mean that these businesspeople delegates have any real power in determining government policies. Rather, it signifies that firms owned by these delegates achieve a certain level of status, leading them to be considered critical to the local economy or specific industries. Accordingly, governments aim to build good relationships with them.

Local governments have incentives to offer land price discounts when institutionally embedded firms intend to purchase land from them. First, having representatives in the PC and the CPPCC signals to local governments that these firms possess the necessary financial

resources and abilities to complete their proposed projects. Second, local governments also desire these firms to settle in their localities to provide more taxation and job opportunities.

Based on the above arguments, I formulate the following hypotheses:

Hypothesis 3.1. *Firms with political ties receive land price discounts when purchasing land.*

Hypothesis 3.2. *The influencing politics mechanism provides larger land price discounts than the reputation, access to information, and institutional embeddedness mechanisms.*

3.2.2 Land Auctions in China

This section provides detailed descriptions of the auction methods used in China's land market and how connected firms obtain various land discounts by entering different types of auctions.

A local independent committee in each city plans the overall land sale quota every year, determines the usage and other constraints related to each plot to be sold, and sets a reserve price when a plot of land becomes available. A land reserve price is determined by land quality, such as its flatness, proximity to main roads and city centers, and surrounding land prices. Once a piece of land has a reserve price, it is then turned over to the local Land and Resources Bureau to prepare for sale. There are four ways to sell a piece of land through the primary market: English auction (*paimai*), two-stage auction (*guapai*), invited bidding (*zhaobiao*), and bilateral agreement (*xieyi*).

English auctions are standard ascending auctions that local governments' Land and Resources Bureaus publicly announce 20 working days in advance. The announcement includes the time and place of the auctions as well as basic information regarding the property for sale. All qualified land developers are permitted to bid for these properties. Such auctions are often videotaped, with members of the press present (Cai, Henderson and Zhang, 2013). In principle, the bidder who offers the highest price wins.

Two-stage auctions must also be announced 20 working days in advance. However, the auction period is divided into two stages. During the first stage (normally 10 days), individuals may privately submit ascending bids in person or to the Land Resources Bureau. If only one bidder remains at the end of the first stage, and their bid is not lower than the

reserve price, then the auction concludes. However, if two or more bidders are still interested in the land at the end of the first stage, the auction transitions to an English auction for the second stage, with only active bidders from the first stage allowed to participate. The highest bid from the first stage becomes the reserve price for the second stage.

Finally, invited bidding and bilateral agreement auctions are the least transparent types. For the invited bidding auction, local governments have the authority to select qualified bidders, and only those individuals or firms with invitations are permitted to participate. By law, the number of invited bidders must exceed three, but there are no standardized criteria for selecting qualified bidders. Local governments must provide information about the lands and the auction timeline 20 days in advance. During the auction, invited bidders submit their bids and provide a security deposit. Within 10 days after the auction, local governments must form an evaluation committee of at least 5 members to decide the winner and inform them once decisions are made.[16]

The bilateral agreement method is employed when a piece of land has only one interested buyer after the government announces its availability. In such cases, the local government forms a committee to evaluate the land quality and decide the reserve price. The local government then negotiates with the potential buyer to determine the final sale price. In principle, as long as the final price is not lower than the reserve price, the land can be sold.[17]

The bilateral agreement and invited bidding methods are most vulnerable to corruption, which is why the Chinese central government eventually issued a regulation to restrict the use of these auction methods.[18] However, exceptions to these restrictions exist, such as when a piece of land is deemed a "cold property," meaning it interests only one buyer. In such cases, local governments may resort to a bilateral agreement. Properties with more than one potential buyer or intended for commercial and residential use must be sold using one of the other three methods.

Because invited bidding and bilateral agreement are the least transparent auction types, I expect that firms able to influence local politics are more likely to enter such auctions.

[16]Detailed information on this type of auction can be found at bit.ly/3K6cHqX.

[17]Detailed information on this type of auction can be found at bit.ly/3x4kf5G.

[18]This regulation was issued in 2003: Provisions on the Agreement-based Assignment of the Right to Use State-Owned Land.

Connected firms can collude with government officials to reduce land prices and potential competitors through several channels. First, it is difficult for outsiders to obtain information about land reserve prices, allowing connected firms to interfere in the land evaluation process and reduce the land reserve price at the initial stage. Second, local governments have the authority to decide who gets to participate in auctions, thereby allowing only politically connected firms to participate. Third, these auctions do not require local governments to display bids publicly during auctions, which provides opportunities for price manipulation. Finally, the highest bidders are not guaranteed to win in invited bidding because local governments have the right to choose the winner based on overall considerations, and the criteria included in these considerations are subject to their discretion.

Firms with good reputations do not have as strong a local network as firms with local political ties, which limits their ability to directly influence land reserve prices. However, they can collude with government officials to prevent potential competitive buyers from entering two-stage auctions. First, local governments have the authority to decide which potential buyers qualify for two-stage auctions; they can use their discretionary power to screen out potential buyers from entering the first stage. Second, as documented by Cai, Henderson and Zhang (2013), local governments can delay the approval time for competitors' qualifications to enter the auction until the first stage is underway. A connected firm can bid at the reserve price immediately after the auction starts, signaling to potential buyers that the first bidder is highly likely to have already reached an implicit agreement with the local government and that a connected bidder will dominate the auction. Consequently, unconnected firms either do not attend or withdraw their participation. The last channel—an understudied yet viable channel—for manipulating a two-stage auction is information leakage. As discussed above, the first period of a two-stage auction lasts 10 days, which provides an opportunity for government officials to leak information about potential competitors to connected firms so that they can use their social or political influences to deter potential buyers from entering auctions or further raising bids.

Due to data limitations, I cannot identify the channel through which two-stage auctions help firms obtain land discounts. However, the scope of the data I acquired allows me to study the intensity of competition during auctions. The land premium rate reflects the intensity

of bidding during auctions; a low premium rate indicates that the final land transaction price is close to its reserve price, which in turn suggests low competition. Empirically, if I find the premium rate to be significantly lower for connected firms in two-stage auctions, then I can infer that they face less competition. Moreover, I can compare the premium rate between firms with LPCs and GPCs to determine the different impacts of the two types of connections on the intensity of competition firms face during auctions.

Based on the above arguments, I propose the following hypotheses:

Hypothesis 3.3. *Firms that are able to influence local politics are more likely to enter into bilateral agreement and invited bidding auctions than firms with other types of political connections.*

Hypothesis 3.4. *Firms with good reputations are more likely to enter into two-stage auctions.*

3.3 Data and Variable Construction

The land data are web-scraped from the China Land Transaction Monitoring System. A detailed description is provided in Section 2.4 of Chapter 2. Figure B1 in the Appendix illustrates the distribution of land transactions in each city across China.

From the CSMAR Database, I collected all the annual reports of Chinese listed companies from 2010 to 2017 to obtain their basic financial information (including total assets, total employees, and shareholders' information), as well as career background data on each firm's senior executives, board members, and board of supervisors.[19]

I then matched the firms' financial data with the land transaction data based on each firm's full name, including its subsidiaries. Firms with no land transactions were excluded

[19]Based on the Company Law of the People's Republic of China, "a joint-stock company limited shall have a supervisory committee composed of at least three persons, with one of them elected as the convener. The supervisory committee comprises representatives of shareholders and an appropriate proportion of representatives of staff and workers. The specific proportion of workers shall be stipulated in the articles of association. The representatives of workers shall be elected by the workers through democratic processes. Directors, the manager, and financial officers shall not serve concurrently as supervisors."

from the sample.[20] Among the sample of all listed companies, 10,960 publicly listed companies and their subsidiaries participated in at least one land transaction between 2010 and 2017. Because many companies engaged in multiple transactions over that eight-year period, the total number of land transactions amounts to 23,784. Figure B2 in the Appendix B displays the distribution of land transactions by publicly listed firms. I also used information on the location of these land parcels to find auction information from local land bureau websites, which includes approximately 5,000 observations on reserve price and 3,000 on land premium rate.[21]

3.3.1 Variable Construction

I construct five variables to identify the different mechanisms by which firms can benefit from political connections. Inspired by the paper by Chen et al. (2016), I construct **general political connections** to identify the reputation effect of firms. I consider firms to have GPCs in a given year if they have senior executives or board members who held government positions at the vice-prefecture level or above before joining the firm. These positions include such as (vice) party secretary, (vice) mayor, and members of the standing committee at the city level of government. My sample includes prefecture, vice-provincial, and provincial-level cities. I choose the vice-prefecture level and above because most government officials at these administrative levels tend to be local leaders or bureau leaders, meaning they have decision-making power before they leave the government. Therefore, having these high-profile government officials as board members sends positive signals to governments.

I use **locality-specific political connections** to capture firms' potential ability to influence local governments. I define firms as having LPCs if one of their senior executives

[20]Table B1 in the Appendix B presents the comparison between the matched and unmatched samples, indicating that publicly listed firms purchased more land but acquired land of lower quality than non-publicly listed firms.

[21]Table B2 in the Appendix shows the comparison between the matched and unmatched samples. I find that larger firms that bought larger parcels of higher quality and at higher prices are less likely to have auction records. However, it is safe to assume that larger firms possess more political resources to influence land prices. Thus, the results reported here, based on the matched sample, provide conservative estimates of the effects of political connections despite the selection bias. In the Results section, I present empirical evidence using a Heckman selection model to confirm that the effect of political connections increases even after correcting for sample selection.

or board members once held positions at the vice-prefecture level of government or higher in cities where the firms purchased lands. The core difference between LPCs and GPCs is that the latter applies as long as firms have senior executives or board members who held positions above the vice-prefecture level before they retired. However, these senior executives or board members do not need to have held these positions in the places where the firms purchased lands. In other words, firms with LPCs have the ability to leverage local networks and influence local governments because they have board members who were previously high-profile government officials in certain localities.

Local experience refers to a firm's information advantage if one of its senior executives or board members has worked in a prefecture where the firm has purchased land. While similar to LPCs, this measure differs in that the firm's senior executives or board members do not need to have held vice-prefecture government positions or higher. LE can capture a firm's information advantage because such work experiences provide firms with a more comprehensive understanding of local government policies and informal institutions (such as local cultural and social norms) as well as more immediate access to business-related information and opportunities than firms without LE connections.

To measure **institutional embeddedness**, I use two dummy variables—PC and CPPCC—which equal 1 when a firm's board members are representatives of the local People's Congress or the Chinese People's Political Consultative Conference.

Moreover, if board members have friends or relatives working in the government, firms could leverage such relationships to obtain cheaper land. To account for this possibility, I construct two measures to indicate whether firms' board members have friends or relatives working in governments. The data regarding these connections come from the CSMAR Database, which collects information based on publicly disclosed online sources. Since this information is self-reported, it does not necessarily reflect all the connections board members may have.[22] However, given the challenges in collecting exact connection information, this is the best available method for constructing these two connection variables.

[22]To reduce self-selection bias, I regressed firms' total assets, number of employees, and ownership on their friends' and relatives' connections variables based on my data (Results are shown in Table B9 in the Appendix B.). I found some evidence that large firms are less likely to report having friends' or relatives' connections.

Table B3 in the Appendix presents summary statistics for land and firms. Table B4 displays the distribution of different types of political connections across transactions. The correlation matrix for various connection measurements is shown in Appendix Figure B3.

3.4 Empirical Strategy

3.4.1 Baseline Model

To capture the effects of different types of political connections, I use the following equation combined with the connection measurements I constructed in the previous section.

$$\begin{aligned} Log(Price_{icjt}) = \beta_1 GPC_{jt} + \beta_2 LPC_{icjt} + \beta_3 LE_{icjt} + \beta_4 PC_{jt} + \beta_5 CPPCC_{jt} \\ + \gamma_1 X_{icjt} + \gamma_2 Z_{jt} + \alpha_j + \lambda_c + \mu_t + \epsilon_{it} \end{aligned} \tag{3.1}$$

In this equation, $Log(Price_{icjt})$ represents the logged price (RMB per square meter) of land i in city c bought by firm j in year t. GPC_{jt} measures whether firm j has GPCs in year t. LE_{icjt} denotes whether firm j has LE when buying land i from city c in year t. LPC_{icjt} follows the same notation. X_{icjt} is a vector of transaction-level control variables: average land prices of each city, area of the land, land leasing period, auction method, land quality, and intended usage of the land. Z_{jt} is a vector of firm-level controls: logged total assets, total debt, and total employees. I also control for firm fixed effects measured by α_j, city fixed effects measured by λ_c, and year fixed effects measured by μ_t. Standard errors are clustered by firm and city.

The identification strategy assumes that firms' unobserved characteristics cannot endogenously decide firms' political connections. The best solution for the endogeneity issue is to find exogenous variations that determine firms' political connections. Given the difficulty in finding such exogenous variations, I discuss how I mitigate this concern by controlling for observed potential confounders.

Firms could exhibit unobserved heterogeneity that increases their likelihood of having connections with local governments and obtaining cheaper land from them. The study by

Chen and Kung (2018) shows that firms connected to "princelings," whose family members are members of China's Politburo Committee, receive significant land price discounts. However, information regarding who these "princelings" are is not publicly available and is highly unreliable; thus, I cannot directly control for it.[23] Instead, I use firm fixed effects to mitigate this concern, which also helps to control for firm-level time-invariant unobservable confounders.

The industrial sectors to which firms belong may also correlate with their political connections and land prices. For example, high-technology companies are more attractive to local governments, thereby increasing their likelihood of having good connections with local governments and making it easier for them to obtain cheaper land. To address this concern, I add industrial fixed effects to the baseline model.

Finally, firms' ownership could also serve as a confounding variable. For instance, state-owned enterprises naturally have good relationships with governments and can more easily obtain various resources. To tackle this issue, I create several dummy variables to indicate whether firms are state-owned enterprises, privately owned enterprises, or foreign enterprises.[24].

3.4.2 Auction Method and Effect on Land Price

To study whether connected firms are more likely to enter opaque auctions, I employ a fixed effects linear probability model. The model specification is the same as in Equation 3.1, but the dependent variables are two dummy variables that equal one when the auction

[23]While some online websites or news reports provide some information regarding the identity of these "princelings," they are not official sources and are difficult to verify.

[24]In contrast to other studies (Wang, 2017; Chen et al., 2016) that use the percentage of state and foreign shares as indicators of firms' equity nature, I use a firm's actual controller. If a firm is actually controlled by the government, then its equity nature is that of a state firm. If a firm is actually controlled by an individual, then it is a private firm. One advantage of using this method is that it can uncover advantages that firms may enjoy as a consequence of their connections with actual controllers. For example, although Chinese real estate firm Vanke's state share, owned by ShenZhen Subway Limited Company, is 15%, by definition, Vanke's state share does not exceed 50%; therefore, it is not a state firm but rather a private firm. We would not expect Vanke to obtain many benefits from this connection. However, if we consider its actual controller—the State-owned Assets Supervision and Administration Commission of the State Council—we would expect Vanke to benefit from this strong connection. In the econometric specifications, this approach helps better control for other channels through which firms may receive favorable treatment, thereby obtaining a cleaner net effect of political connections.

type is either invited bidding and bilateral agreement, or two-stage auctions.

3.4.3 Event Study on Stock Market Return

I conduct an event study to examine the effects of negative political shocks on firms' stock market returns. To do this, I first identified all anti-corruption cases involving government officials who were mayors or party secretaries. Then, I matched these localities with all firms' land transaction records. Using the above procedures, I identified firms that purchased land from such localities. These firms are used to construct the event study data sample. In this data sample, all firms experienced negative political shocks but have different types of political connections. The goal of my analysis is to identify the variation in firms' stock market prices surrounding event dates in relation to their different political ties.

I follow the approach of Acemoglu et al. (2016) when conducting the event study. I calculate cumulative abnormal returns (CAR) using 0, 3, 5, and 10 days as event windows:

$$CAR[-n, n]_i = \sum_{t=-n}^{n} AR_{it}$$

where t is time and n is the upper limit of the event window. When n equals 0, it means the CAR at the event date; when n equals 2, it means the CAR 2 days before the event and two days after it (5 days in total). AR_{it} is the abnormal return for firm i and time t, calculated as follows:

$$AR_{it} = R_{it}(actual) - \left[\hat{\alpha}_i + \hat{\beta}_i R_{mt}\right]$$

where $R_{it}(actual)$ is firm i at time t's actual market return, which I obtained from CSMAR. R_{mt} is the market return using the weighted average returns of the Shanghai and Shenzhen stock exchanges; and $\hat{\alpha}_i$ and $\hat{\beta}_i$ are estimated based on the 60 days before the event by regressing firm i's true market return on weighted overall market return.

Once I obtain the cumulative abnormal returns for each firm, I use the following equations to study the effects of political connections:

$$\begin{aligned} CAR_i = {} & \beta_1 GPC_{it} + \beta_2 LPC_{it} + \beta_3 LE_{it} + \beta_4 PC_{it} \\ & + \beta_5 CPPCC_{it} + \gamma_1 X_{it} + \lambda_p + \mu_t + \epsilon_i \end{aligned} \tag{3.2}$$

where CAR_i is the cumulative abnormal returns for firm i around the event date. X_{it} is a vector of controls for firms. λ_p and μ_t are province fixed effects and year fixed effects.

3.5 Results

3.5.1 Identifying the Value of Political Connections

Table 3.1 shows the results from Equation 3.1. In column (1), the model is fitted with firms' political connection measurements, city, year, and firm fixed effects. Consistent with my expectations, all political connection measures have negative effects on land prices, except for the institutional embeddedness measures. The coefficient for LPCs is -0.368, meaning that firms with such connections enjoy a 31% ($(exp(-0.368)-1)*100$) land price discount. When firms have GPCs, the land price is reduced by 13%. The effect of LE is around 11%.

Based on the statistical evidence from column (1), I find that firms' reputation (measured by GPC), local political influence (measured by LPC), and access to local information (measured by LE) all contribute to land price discounts when firms purchase land from local governments. However, the effects of political influence are substantially larger than those of the other mechanisms. This finding is consistent with Ang and Jia (2014) regarding the effect of political connections on firms' use of the formal legal system in China, where "know-how" and "know-who" influence firms' legal choices, but the effect of the latter is greater than the former.

It should be noted that several confounding variables may bias the estimation. One concern is that when firms' board members have friends or relatives working for governments, firms could use these relationships to build local or general political ties and influence local land deals. To mitigate this concern, I added two additional connection variables—government friends' connections and relatives' connections—in column (2). The results were almost identical to those in the first model.

The models in columns (3) and (4) employ different control variables for robustness checks. As demonstrated in section 3.4, firms' ownership can affect their political connections

Table 3.1: Effects of Political Connections on Land Prices

	(1)	(2)	(3)	(4)
General Political Connections	-0.138*	-0.134**	-0.143**	-0.143**
	(0.070)	(0.068)	(0.069)	(0.069)
Locality-specific Political Connections	-0.368**	-0.356**	-0.370**	-0.373**
	(0.182)	(0.175)	(0.175)	(0.176)
Local Experience	-0.113*	-0.107*	-0.111*	-0.124**
	(0.060)	(0.057)	(0.058)	(0.061)
PC	-0.008	-0.003	-0.009	-0.008
	(0.032)	(0.033)	(0.035)	(0.035)
CPPCC	0.060	0.056	0.058	0.058
	(0.040)	(0.038)	(0.038)	(0.038)
Control Variables	YES	YES	YES	YES
City Fixed Effects	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES
Firm Fixed Effects	YES	YES	YES	YES
Industrial Fixed Effects	YES	YES	YES	YES
Friends/Relatives Connections	NO	YES	YES	YES
Ownership Fixed Effects	NO	NO	YES	YES
Headquarter	NO	NO	NO	YES
Observations	18926	18926	18926	18926

Note:
[1] Dependent Variable: Log(Land Prices)
[2] The control variables in these models are the city's average land prices, area of the land, land leasing period, auction method, land quality, intended usage of the land, percentage of firms' total political connections in board members, firms' total assets, total employees, and total debt.
[3] Standard errors are clustered by city and firm. *p<.10; **p<.05; ***p<.01.

and the land prices they obtain. Starting from column (3), I included whether firms are privately or state-owned as control variables. The results show almost no change. Moreover, firms may receive preferential treatment and local protection when transactions occur in

localities where those firms are headquartered. To account for this potential bias, column (4) presents the model with a variable indicating whether transactions occurred in firms' headquarters. All estimations remain almost unchanged.

3.5.2 Robustness Checks

In this section, I report the results of several robustness checks for my main findings from the previous section. All results for the robustness checks can be found in Figure B4 in the Appendix. For simplicity, I only plot p-values against the LPC coefficients for each robustness check. For each check, I estimate three models: the first model includes LPCs, GPCs, and LE; the second model includes the PC and CPPCC; and the third model includes firms' headquarters as a control. All models incorporate control variables, firm, city, and year fixed effects. I also control for firms' ownership and industrial sectors.

First, I examine whether there are any firm-level time-varying confounders associated with firms' political status and land prices. Firms that pay more local taxes (or employ a large proportion of local residents) are more likely to have a good relationship with local governments and thus receive favorable treatment. Firms' productivity could also determine their political status and the political rents they obtain (Faccio, 2010). Models marked as Taxation, Employment, and Productivity in Figure B4 in the Appendix present the results after adding control variables for firms' tax payments as a percentage of local fiscal revenue, the percentage of employment of the local population, and productivity. The LPC coefficients change very little and are all significant.

Another potential concern is that the effect of political connections on land prices could have been driven solely by firms in the real estate sector. This concern arises from the fact that real estate firms engage in more land transactions and benefit from building local political connections more than other sectors. However, as seen in the models marked as "Except Real Estate" in Figure B4, the coefficients for non-real estate firms are around -0.22, which helps to alleviate the concern that my results are solely driven by firms in the real estate sector.

3.6 Unpacking the Mechanism

In this section, I present statistical evidence of how firms benefit from political connections. First, I show that less transparent auction methods—bilateral agreements and invited bidding—are associated with the greatest land price discounts, while two-stage auctions provide smaller land price discounts. Second, I demonstrate that firms with LPCs are more likely to enter the former type of auction, whereas firms with GPCs are more likely to enter two-stage auctions. Finally, by analyzing land reserve prices and premium rates, I show that connected firms receive different degrees of favorable treatment before and during auctions.

3.6.1 Land Auction

Table B5 in the Appendix illustrates the impact of various auction methods on land prices. The findings in column (1) reveal that less transparent auction methods decrease land prices by 56%, while those in column (2) suggest that two-stage auctions result in a reduction of land prices by only 28%. This implies that if locally connected firms are more inclined to participate in bilateral agreements or invited bidding, they would benefit from greater land price discounts compared to firms with GPCs.

Column (1) in Table 3.2 presents the fixed effect linear probability model. The statistical evidence indicates that firms with LPCs are 8% more likely to participate in bilateral agreements and invited bidding auctions. Column (2) reports the results after incorporating variables related to friends' and relatives' connections, while columns (3) and (4) include the firm's ownership and whether transactions occurred at the firm's headquarters as additional robustness checks. All results suggest that firms with local political ties are more likely to enter less transparent auctions, thus confirming Hypothesis 3.2.

The right five columns present results for two-stage auctions. The findings indicate that firms with good reputations are 10% more likely to participate in two-stage auctions. Models 6 to 8 sequentially incorporate control variables similar to those in models 2 to 4. All results remain consistent and demonstrate positive and statistically significant effects on two-stage auctions, thus confirming Hypothesis 3.4.

Table 3.2: Effect of Political Connections on Auction

	Invited Bidding and Bilateral Agreement				Two Stage Auction			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
General Political Connections	-0.038	-0.038	-0.043	-0.038	0.093**	0.095**	0.094**	0.093**
	(0.028)	(0.028)	(0.029)	(0.028)	(0.043)	(0.043)	(0.044)	(0.043)
Locality-specific Political Connections	0.079**	0.081**	0.076**	0.078**	-0.053	-0.055	-0.054	-0.051
	(0.037)	(0.037)	(0.037)	(0.037)	(0.045)	(0.045)	(0.045)	(0.045)
Local Experience	0.027	0.028	0.025	0.023	0.001	0.002	0.001	0.011
	(0.026)	(0.025)	(0.026)	(0.027)	(0.039)	(0.039)	(0.039)	(0.040)
PC	-0.005	-0.004	-0.006	-0.005	-0.000	-0.002	-0.000	-0.001
	(0.011)	(0.011)	(0.011)	(0.011)	(0.013)	(0.013)	(0.014)	(0.013)
CPPCC	-0.000	-0.000	0.000	-0.000	0.016	0.015	0.016	0.016
	(0.010)	(0.010)	(0.010)	(0.010)	(0.013)	(0.013)	(0.013)	(0.013)
Control Variables	YES	YES	YES	YES	YES	YES	YES	YES
City Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Firm Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Friends/Relatives Connections	NO	YES	NO	NO	NO	YES	NO	NO
Ownership Fixed Effects	NO	NO	YES	NO	NO	NO	YES	NO
Headquarter	NO	NO	NO	YES	NO	NO	NO	YES
Observations	18932	18932	18932	18932	18932	18932	18932	18932

Note:

[1] The dependent variable in Models 1 to 4 is a dummy variable indicating whether the auction method is invited bidding or bilateral agreement. The dependent variable for the last four columns is a dummy variable indicating whether the auction method is a two-stage auction.

[2] The control variables in these models are the area of the land, land leasing period, land quality, intended usage of the land, percentage of firms' total political connections in board members, firms' total assets, total employees, and total debt.

[3] Standard errors are clustered by firm. *p<.10; **p<.05; ***p<.01.

3.6.2 Land Reserve Prices and Premium Rate

To further investigate how local connections affect land auction processes, I utilize Equation 3.1 with two dependent variables: logged land reserve prices and land premium rates.[25] Table 3.3 presents the results. The coefficient for LPCs in model 1 is -0.45 and statistically significant, suggesting that land reserve prices will decrease by 36% when firms can influence local politics. Additionally, the coefficient for GPCs implies that firms with such connections do not experience a reduction in land reserve prices.

For auction premium rates, Model 4 reveals that firms with GPCs have an approximately 5% lower premium rate than firms without connections. However, this effect increases to 13% if firms have LPCs. While this magnitude seems small, when compared with the average premium rate for unconnected firms, which is 4%, the LPC effect appears significant.

Table 3.3 also presents models with additional control variables as robustness checks. Comparing these results with those reported in models 1 and 4, it is evident that firms' headquarters and other political connection measurements barely influence the effects of GPCs and LPCs.

Meanwhile, as these auction records represent only a portion of my entire sample, there is a concern that the above results could suffer from sample selection bias. In Table B2 in the Appendix, I conducted a mean test between the matched sample and the unmatched sample. The results reveal that larger firms with more political connections are less likely to have auction records. To address the sample selection concern, I used the Heckman selection model to correct the sample bias (results are shown in the Appendix Table B6). The effect of LPCs on land reserve price and premium rate is more pronounced after sample correction. Overall, the results from the selection model still confirm my hypothesis.

All the statistical evidence from the last two sections suggests that connected firms receive varying degrees of favorable treatment through distinct mechanisms. Firms with LPCs have the ability to manipulate land reserve prices before auctions and encounter fewer competitors during land auctions, resulting in substantial land price discounts. However, firms with GPCs can only limit potential buyers during the auction period, thus enjoying

[25]Land premium rate is calculated as (Transaction Price - Reserve Price) / Reserve Price * 100%.

Table 3.3: Effects of Political Connections on Land Reserve Price and Premium

	Log(Reserve Price)			Premium Rate		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
General Political Connections	-0.002	-0.002	0.089	-5.337**	-5.569**	-5.013**
	(0.113)	(0.108)	(0.125)	(2.601)	(2.589)	(2.489)
Locality-specific Political Connections	-0.450**	-0.448**	-0.370**	-13.828**	-14.302**	-13.452**
	(0.220)	(0.216)	(0.181)	(6.119)	(5.947)	(5.669)
Local Experience	0.017	0.020	0.020	-1.030	-1.398	-1.432
	(0.083)	(0.084)	(0.080)	(2.392)	(2.368)	(2.381)
PC	0.049	0.040	0.060	-0.376	-0.207	-0.224
	(0.079)	(0.080)	(0.077)	(1.220)	(1.223)	(1.232)
CPPCC	0.020	0.024	0.035	0.662	0.462	0.581
	(0.094)	(0.096)	(0.093)	(1.513)	(1.544)	(1.509)
Control Variables	YES	YES	YES	YES	YES	YES
City Fixed Effects	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES
Firm Fixed Effects	YES	YES	YES	NO	NO	NO
Ownership Fixed Effects	YES	YES	YES	YES	YES	YES
Friends/Relatives Connections	NO	YES	NO	NO	YES	NO
Headquarter	NO	NO	YES	NO	NO	YES
Observations	4284	4284	4398	2370	2370	2370

Note:

[1] The control variables in models (1) to (3) are the average reserve price within cities, land area, land leasing period, auction method, land quality, intended usage of the land, percentage of firms' total political connections in board members, firms' total assets, total employees, total debt, and firm's ownership. The control variables in models (4) to (6) are the same as in (1) to (3) except for no control on auction methods.

[2] Standard errors are clustered by firm. *p<.10; **p<.05; ***p<.01.

fewer land discounts compared to firms with LPCs.

3.7 Effects of Anti-Corruption Campaign

This section provides empirical results regarding how the recent anti-corruption campaign in China influenced the value of political connections in the land market and firms' stock market returns when they experience negative political shocks.

3.7.1 Effects of Anti-Corruption Campaigns on the Land Market

To further test my argument that local political authorities provide rent to connected firms through manipulating land auctions, I utilize the recent anti-corruption campaign as an exogenous shock. The rationale is that if political connections are leveraged through land auction manipulation, then after the anti-corruption campaign, the effects of LPCs on these variables should disappear.

Figure 3.1: LPC Effect on Land Prices over Time

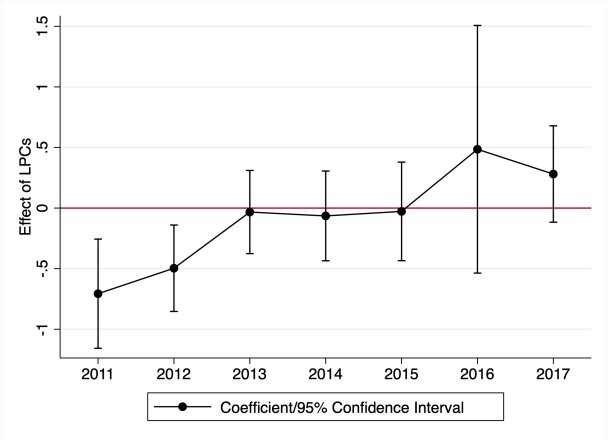
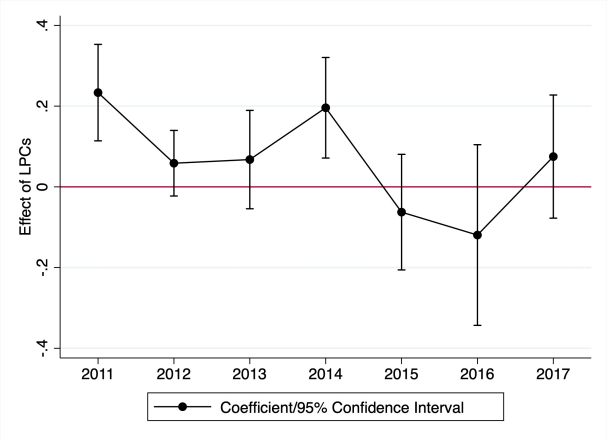


Figure 3.2: LPC Effect on Auction Method over Time



Notes: The figure on the left shows the effects of LPCs on land prices over time. The figure on the right plots the LPCs effects on invited bidding and bilateral agreement auctions.

Figures 3.1 and 3.2 depict the coefficients with 95% confidence intervals for the interaction terms between LPCs and year dummies, and the interaction term between the

less transparent auction dummy and year dummies, using Equation 3.1. This provides an overview of the average size of the discounts obtained by connected firms and the likelihood of using less transparent auction methods over time, relative to the benchmark year of 2010. Figure 3.1 illustrates that the effects of LPCs on land price discounts gradually diminish to zero after 2013 and nearly disappear entirely after 2015. This suggests that the anti-corruption campaign achieved its goal of curbing corruption, particularly in the land market. Additionally, Figure 3.2 demonstrates a significant shift in the choices of auction methods over time. Shortly after Xi assumed the presidency, the likelihood of using less transparent auction methods markedly decreases, reaching zero in 2013 and remaining near zero thereafter. Overall, these figures indicate that the effect of political connections vanishes after the anti-corruption campaigns.

In summary, I find that the value of political connections diminishes in both land price discounts and auction methods. These findings reaffirm my previous conclusion that political connections operate through auction manipulation.

3.7.2 Effects of Anti-Corruption Campaign on Connected Firms

The final empirical exercise is to quantify the stock market reactions to politically connected firms around the days when local political leaders were announced being disciplined during the anti-corruption campaign.

Table 3.4 presents the cumulative abnormal return (CAR) for different time intervals. Column (1) displays the results on the day when events occur and indicates that there is no effect of GPCs on firms' CAR at the event date. The coefficient for LPCs is negative and significant, implying that a firm's stock market price would experience a negative abnormal return of 2% if the firm has LPCs. Model 2 expands the event window to one day before the announcement and one day after it (3 days in total). GPCs continue to have no effect on stock market prices, while the coefficient for LPCs becomes smaller but remains significant. Models 3 and 4 present the results when the event window extends to 5 days and 10 days, respectively. All coefficients for LPCs are negative and increasingly large. The LE and PC have no effect on stock market prices across all event windows.

Table 3.4: Effect of Anti-corruption on Firms Stock Market Return

	(1)	(2)	(3)	(4)
	CAR[0]	CAR[-1,1]	CAR[-2,2]	CAR[-4,5]
General Political Connections	0.00130	0.00386	0.0103**	0.0186***
	(0.41)	(0.96)	(2.35)	(3.14)
Locality-specific Political Connections	-0.0183***	-0.0124**	-0.0159**	-0.0266***
	(-3.25)	(-2.07)	(-2.24)	(-2.87)
Local Experiencee	-0.000398	0.00334	0.00162	-0.00286
	(-0.17)	(1.07)	(0.45)	(-0.62)
PC	0.000184	-0.00334	-0.00149	0.00631
	(0.06)	(-0.93)	(-0.35)	(1.20)
CPPCC	-0.00354	-0.00226	-0.00504	-0.0140***
	(-1.47)	(-0.73)	(-1.39)	(-3.04)
Firm Level Controls	YES	YES	YES	YES
Province Fixed Effects	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES
Ownership Fixed Effects	YES	YES	YES	YES
Observations	1809	1809	1796	1796

Note:
[1] Firm-level control variables in all models are total assets, total employees, total debt.
[2] t statistics in parentheses. *p<.10; **p<.05; ***p<.01.

Interestingly, firms with GPCs experienced positive CARs over the 5- and 10-day event windows. This suggests that, despite firms experiencing local negative shocks, their connections with high-profile government officials outside the event localities still protect firms' stock market prices from further decreasing.

Table B8 in the Appendix also presents several robustness checks. First, the negative cumulative return could result from pessimistic economic expectations in areas that expe-

rienced political shocks. To address this concern, I create a dummy variable equal to 1 if firms are located in such places and 0 otherwise. The results are reported in Table B8, Panel A. Overall, they indicate that the negative cumulative return reported above is not solely caused by pessimistic expectations. An additional concern is that the results may be driven by investors' negative expectations regardless of the types of connections that firms have. To mitigate this concern, I also create a dummy variable equal to 1 if firms have political connections other than locality-specific connections (see Table B8, Panel B). Once again, the results suggest that if firms do not have locality-specific connections, they would not experience negative CARs, implying that local political connections are the primary determinant affecting firms.

How substantively important is this effect? To answer this, considering a firm with a market value of 9.27 billion RMB, which is the average value of Chinese listed companies in the A-share market. If this firm has LPCs and experiences negative political shocks during the anti-corruption campaigns, it would undergo a nearly 3% CAR, translating to approximately 278 million RMB of its market value over 10 days.

3.8 Conclusion

In this chapter, I study the different mechanisms by which firms can benefit from political connections and the channels through which they operate in China's land market. By exploring variations in firms' political status across different land transactions, I find that firms with political connections receive land price discounts when purchasing land from local governments. More importantly, firms that can influence local politics pay substantively lower land prices than through other mechanisms, such as having a good reputation. Additionally, I show that connected firms are more likely to engage in less transparent auctions. Consequently, they enjoy lower land reserve prices and face fewer competitors during auctions.

A few questions can be studied in the future. In a recent book, Ang (2020) argues that the central government intentionally allows local politicians to manipulate formal in-

stitutions for personal gain as long as such corrupt behavior is growth-enhancing. Wang (2021) shows that anti-corruption measures undermine bureaucrats' productivity by frightening them away from engaging in informal land-selling practices that are growth-enhancing yet usually associated with corruption. Their findings raise the question of how the central government prevents growth-enhancing corruption from degenerating into mass corruption that is detrimental to economic development and state legitimacy.

Another promising area to explore is how different types of political connections operate in the local market in general. In my study, I find that different political ties operate through distinct mechanisms. However, it would be interesting to analyze whether different types of connections can complement or substitute each other, and how firms with different types of political connections compete in the local market.

4.0 Political Selection, Resource Allocation, and Economic Growth Potential

4.1 Introduction

Scholars have demonstrated that societies with institutions that allocate resources more efficiently experience better economic growth. If this is the case, then why do countries misallocate resources, even though their economies could benefit from more appropriate allocation? The state-of-the-art answer in the literature suggests the important role of political incentives in explaining public resource misallocation (Acemoglu, Johnson and Robinson, 2005; Mani and Mukand, 2007). However, the micro-mechanisms linking political incentives, resource misallocation, and economic growth remain unclear in the existing literature.[26] This chapter contributes to the literature by providing both a theoretical model and empirical analysis of how political promotion incentivizes subnational leaders to distort resource allocations, consequently undermining the potential for long-term economic growth.

The study of resource misallocation is important because it is a crucial factor in understanding spatial inequality within a nation (Hsieh and Moretti, 2019), productivity differences across sectors (Adamopoulos et al., 2022), and income differences across countries (Jones, 2011). Recognizing the significant role that governments play in determining resource allocation, it is imperative to examine how political incentives influence leaders to deviate from the optimal allocation of resources.

Theoretically, I develop a model in which political principals must rely on economic performance to evaluate subnational leaders' abilities in the face of information asymmetry. Subnational leaders need to make trade-offs when allocating resources between two types of development investment that contribute to economic growth differently. The first type is high-quality investment, encompassing development policies with future benefits, such as education, health, and research and development (R&D), which increase productivity and

[26] A large body of literature studies the political logic of public service delivery and resource allocations. For a theoretical treatment, see De Mesquita et al. (2005), Acemoglu and Robinson (2006), Jones (2011), Bonfiglioli and Gancia (2013); for empirical work, see Stasavage (2005), Harding and Stasavage (2014), Gulzar and Pasquale (2017), Williams (2017), Toral (2022), Raffler (2022).

contribute to long-term growth potential. However, these require significant time to achieve their goals and involve complex coordination between governments and the private sector. The second type is low-quality investment (e.g., real estate investment), which stimulates short-term economic growth but has a limited ability to sustain long-term economic development.

Within this context, the model predicts that as information asymmetry between subnational leaders and their principals increases, the former allocate more resources to low-quality investment to directly increase their promotion chances, while allocating fewer resources to high-quality investment that contribute to long-term growth potential. Moreover, the model predicts that the impact of information asymmetry is magnified by the career incentives of local leaders.

More importantly, the model reveals a second layer of efficiency loss within the political promotion system, termed "institutional failure," where the political incentives of principals drive them to craft policies that diverge from optimal economic allocation. Moreover, when principals have institutionalized mechanisms to influence the decision-making processes of their subordinates, it creates an "amplifying effect." This effect occurs as institutional failure intensifies agency failure, causing a more substantial deviation from optimal economic allocation. Consequently, the combination of institutional and agency failures leads to significant distortions in resource allocation, hindering localities from achieving their developmental potential.

I test the theoretical predictions in the context of China, where the career advancement of prefecture leaders is decided by provincial governments based on their performance (Li and Zhou, 2005; Xi, Yao and Zhang, 2018). Economic decentralization ensures that prefecture leaders have the authority to allocate public resources within their jurisdictions, while political centralization ensures that their policies remain aligned with the broader objectives set by higher-level governments (Xu, 2011).

I construct an information asymmetry index by integrating the geographical distances between localities and their provincial capitals with topographic data, specifically terrain ruggedness along the route. The underlying assumption is that the farther a locality is from political centers, the more pronounced the information asymmetry problem becomes, and

conversely, the closer it is, the lesser the issue. This rationale aligns with research on how geographical distance from capitals affects governance quality (Stasavage, 2010; Campante and Do, 2014). Additionally, I select the total real estate investments as indicators of low-quality investment, while education expenses are selected to represent development initiatives that contribute to long-term growth potential. In line with Vandenbussche, Aghion and Meghir (2006), I adopt total factor productivity (TFP) as an indicator of long-term economic growth potential. TFP reflects improvements in efficiency, innovation, and technological progress; these improvements are essential for sustained economic growth over the long term.

The empirical analysis unfolds in four steps. Initially, I offer empirical evidence showing that increased investment in the real estate sector correlates with reduced productivity, while increased investment in human capital correlates with an increase in productivity in China from 2000 to 2015. Using a fixed-effects model, I show that a standard deviation increase in real estate investment lowers productivity by 0.018, whereas a comparable increase in education investment increases productivity by 0.041. Subsequently, I explore the influence of political incentives on resource allocation. The analysis reveals that real estate investment rises by 0.036 standard deviation and education investment falls by 0.044 standard deviation when the information asymmetry index goes up by 1 standard deviation. Further, estimates from a difference-in-discontinuities design demonstrate that career incentives prompt local leaders to allocate resources more heavily toward the real estate sector. Finally, I present empirical evidence of the "amplifying effect." I show that the career incentives of provincial leaders lead to an additional 0.043 standard deviation increase in real estate investment and an additional 0.093 standard deviation decrease in education investment within prefectures.

Taken together, this chapter makes significant contributions to several distinct literatures. First, it contributes to the large literature on the institutional determinants of economic growth by providing micro mechanisms of how the selection of politicians in a multi-layer government influences their incentives for resource allocations and its negative consequences on economic development (North, 1989; Acemoglu, Johnson and Robinson, 2002; Baum and Lake, 2003; Przeworski, 2004; Acemoglu et al., 2019). Second, it provides direct empirical evidence on the effects of information asymmetry on public service delivery (Fearon, 1999;

Stasavage, 2005; Gulzar and Pasquale, 2017; Grossman and Michelitch, 2018).

4.2 Theory

This section presents a theoretical model that captures the political logic of resource allocation within a political promotion system and sheds light on testable hypotheses in the context of China. The model extends the work of Dewatripont, Jewitt and Tirole (1999*a*,*b*) and Mani and Mukand (2007) by incorporating career incentives and performance evaluation in a non-electoral setting and establishing the link between micro-mechanisms and macroeconomic development. Meanwhile, differing from the focus on how the intrinsic differences in "observability" or "visibility" of public goods affect their provision, I explore the impact of differences in contributions to economic growth on politicians' strategic allocation of resources.

4.2.1 Model Setup

I consider two types of development policies $i \in [H, L]$, where H represents high-quality development policies that contribute to long-term economic growth potentials, g_H, such as investment in education, R&D, and health, while L denotes low-quality investments that contribute to short-term economic growth, g_L, such as real estate and roads. x_H and x_L represent the amount of resources local leaders invest in high- and low-quality investment, respectively. For simplicity, we assume $x_H + x_L = 1$.

Economic Growth. GDP growth g_i is a composition of a local leader's ability a, which comes from a normal distribution, $a \sim N(\bar{a}, \sigma_a^2)$, the amount of investment in either high quality- or low-quality investment x_i, and a noisy term ϵ_i, which is drawn from a normal distribution $\epsilon_i \sim (0, \sigma_i^2)$. Specifically, the growth function is:

$$g_i = a + x_i + \epsilon_i \tag{4.1}$$

To capture the fact that high-quality development policies take longer time and more resources and involve more complex input coordination than low-quality investment, I have $\sigma_H^2 \gg \sigma_L^2$.

Production Function. To simplify the discussion, I use a Cobb-Douglas production function where resources only need to be allocated between x_H and x_L.

$$Y_j = x_H^{\rho} x_L^{1-\rho} \tag{4.2}$$

$$C(x_H, x_L) = \frac{1}{2}(C_H x_H^2 + C_L x_L^2) - k x_H x_L \tag{4.3}$$

where Y_j is the total output for city j. The cost function, $C(\bullet)$, is a symmetric and twice continuously differentiable function; it ensures that $C' > 0$ and $C'' > 0$. k indicates whether high- or low-quality investments are complements or substitutes, with $k \in [-\sqrt{c_H c_L}, \sqrt{c_H c_L}]$. A negative k means these two types of investments are substitutes.

Principal's Utility. A principal derives utility from growth based on both types of development investment, with a preference for high-quality investment measured by λ:

$$U_P = \lambda g_H + (1-\lambda) g_L \tag{4.4}$$

In an environment with no information asymmetry, a principal can effectively monitor local leaders' allocation of resources and enforce the allocation based on their preference.

$$U_P = \lambda(a + x_H + \epsilon_H) + (1-\lambda)(a + x_L + \epsilon_L) - C(x_H, x_L) \tag{4.5}$$

Promotion Rule. I assume the principal cares about the agents' abilities and prefers to select agents with the highest ability. However, in an environment with asymmetric information between the two, the former cannot directly observe the latter's ability. One solution for principals is to use an observable performance measure to predict agents' abilities. In the context of my study, the principals rely on GDP growth to update their prior beliefs regarding agents' abilities. A subnational leader, A, obtains a promotion if her expected ability is greater than the expected ability of B; mathematically, I have $E(a_A \mid \boldsymbol{g}_A, \boldsymbol{x}_A^*) - E(a_B \mid \boldsymbol{g}_B, \boldsymbol{x}_B^*) \geq \eta$, where $E(a_j \mid \boldsymbol{g}_j, \boldsymbol{x}_j^*)$ is the principals' expected posterior assessment of local leaders' abilities based on their observed growth vector $\boldsymbol{g}_j$ and investment vector $\boldsymbol{x}_j^*$, and $j \in [A, B]$. The probability of promotion can be defined as follows:

$$P = Pr[E(a_A \mid \boldsymbol{g}_A, \boldsymbol{x}_A^*) - E(a_B \mid \boldsymbol{g}_B, \boldsymbol{x}_B^*) \geq \eta] \tag{4.6}$$

The posterior distribution, based on Bayesian updating, is $P(a \mid \boldsymbol{g}, \boldsymbol{x}^*) = \frac{P(\boldsymbol{g}|a,\boldsymbol{x}^*)P(a)}{P(\boldsymbol{g}|\boldsymbol{x}^*)}$. The larger the positive difference between A and B, the more likely it is that the local leader in A will be promoted. Meanwhile, I assume $\eta \sim Uniform(0, \eta_0)$. It is important to note that this promotion rule also applies to multiple players by considering B as the best person among a group of candidates, excluding A.

Therefore, I can calculate the promotion probability using the cumulative density function of the uniform distribution:

$$P = \frac{1}{\eta_0}(E(a_A \mid \boldsymbol{g}_A, \boldsymbol{x}_A^*) - E(a_B \mid \boldsymbol{g}_B, \boldsymbol{x}_B^*)) \tag{4.7}$$

Because the prior $p(a)$ and the likelihood function $P(\boldsymbol{g} \mid a, \boldsymbol{x}^*)$ are both normally distributed, the posterior distribution is also a normal distribution, with the mean as follows and $\tau_w = \frac{1}{\sigma_w^2}$, $w \in [H, L, a]$ (see Gelman et al., 2013, Ch. 5):

$$E(a_A \mid g_{i,A}, x_A^*) = \frac{\tau_H(a_A + x_{H,A}) + \tau_L(a_A + x_{L,A}) + \tau_a \bar{a}}{\tau_H + \tau_L + \tau_a} \tag{4.8}$$

Local Political Leader's Utility. Local political leaders derive utility from three parts. First, they receive utility V_p if they get promotions with a probability P. Second, if they fail to get promotions, which the probability is $1 - P$, they obtain V_{np}. Finally, they receive a utility gain, B, from investing in high-quality development projects, where $\delta \in [0, 1]$ measures their preferences for long-term economic development. Formally, the local leader's expected payoff is:

$$U_S = (1 - \delta)[PV_p + (1 - P)V_{np}] + \delta B - C(x_L, x_H) \tag{4.9}$$

Substituting equations 4.3 and 4.7 into 4.9 and letting $\triangle = V_p - V_{np}$; local political leader A intends to maximize the following utility function:

$$U_S = (1 - \delta_A)[\frac{\triangle_A}{\eta_0}(E(a_A \mid \boldsymbol{g}_A, \boldsymbol{x}_A^*) - E(a_B \mid \boldsymbol{g}_B, \boldsymbol{x}_B^*)) + V_{np,A}] + \delta_A B - C_A(x_L, x_H) \tag{4.10}$$

Table 4.1: Summary of Mathematic Notations

Notation	Definition
a	Subnational leaders' ability, which draws from $a \sim N(\bar{a}, \sigma_a^2)$
$C(\bullet)$	Cost function for different investment
g_i	Growth equation
x_H	Amount of high-quality investment
x_L	Amount of of low-quality investment
x	Proportion of low-quality investment
σ_i^2	Variances for different investment
λ	Principal's preferences for high-quality investment
τ_w	Inverse of the σ^2
V_p	Local leaders' utility gain of getting promotion
δ	Local leaders' preference for high-quality development
$\triangle$	Differences in utility between receiving a promotion and not receiving one
MC_i	Marginal cost of different investment
$A(x)$	Total factor productivity

4.2.2 Analysis

Local political leaders choose the amounts of investments across two types of development policies to maximize their perceived abilities, $E(a_j \mid \boldsymbol{g}_j, \boldsymbol{x}_j^*)$, and their expected payoff as specified in equation 4.10. Because the strategies for local leaders in A and B are symmetric, I can fix leader B's strategy and focus on how leader A strategically allocates resources to maximize her utility.

By taking the first order condition for equation 4.10, I have:

Proposition 1 *The optimal allocation of high-quality and low-quality development in-*

vestments is given by:

$$\boldsymbol{x}^*_{H,A} = \frac{\partial U_S}{\partial x_{H,A}} = \frac{(1-\delta_A)\triangle_A}{\eta_0}\frac{\tau_H}{\tau_H+\tau_L+\tau_{\bar{a}}} - c_H x_{H,A} + k x_{L,A} \tag{4.11}$$

$$\boldsymbol{x}^*_{L,A} = \frac{\partial U_S}{\partial x_{L,A}} = \frac{(1-\delta_A)\triangle_A}{\eta_0}\frac{\tau_L}{\tau_H+\tau_L+\tau_{\bar{a}}} - c_L x_{L,A} + k x_{H,A} \tag{4.12}$$

Proposition 1 provides leader A's optimal allocation of resources across x_H and x_L. The allocations depend on four factors; first, the leader's preference for high-quality investment, δ; second, the expected difference in obtaining a promotion, $\triangle$; third, the variances associated with high- and low-quality investment and leaders' abilities; and finally, the marginal cost of two types of investment.

The following comparative statics can be derived from Proposition 1. Proposition 2.1 shows that increasing the variance of high-quality development investment, σ^2_H, leads to a decrease in allocation of such investment, $\boldsymbol{x}^*_{H,A}$, yet an increase in allocation of low-quality investment, $\boldsymbol{x}^*_{L,A}$. Intuitively, this means local leaders allocate more resources to developmental policies that can promote economic growth with greater certainty, thereby increasing their chances of promotion.

Proposition 2 (Comparative Statics)

2.1 When σ^2_H increases, it can be obtained that $\frac{\partial \boldsymbol{x}^*_{H,A}}{\partial \sigma^2_H} < 0$ and $\frac{\partial \boldsymbol{x}^*_{L,A}}{\partial \sigma^2_H} > 0$.

2.2 The cross-partial derivative $\frac{\partial \boldsymbol{x}^*_{H,A}}{\partial \sigma^2_H \partial \triangle_A} < 0$ and $\frac{\partial \boldsymbol{x}^*_{L,A}}{\partial \sigma^2_H \partial \triangle_A} > 0$.

2.3 The cross-partial derivative $\frac{\partial \boldsymbol{x}^*_{H,A}}{\partial \sigma^2_H \partial \delta_A} > 0$ and $\frac{\partial \boldsymbol{x}^*_{L,A}}{\partial \sigma^2_H \partial \delta_A} < 0$.

The last two propositions in Proposition 2 elucidate the political logic behind resource allocations between high-quality and low-quality development investments. Proposition 2.2 can be viewed as a conditional effect of career incentives, describing how the effects of the variance of high-quality development investment are influenced by local leaders' expected differences in obtaining a promotion. Local leaders allocate fewer resources to $\boldsymbol{x}^*_H$ and more to $\boldsymbol{x}^*_L$ when the expected difference increases. Proposition 2.3 demonstrates that conditional on the noise for high-quality development projects, increasing a local leader's preference for long-term economic growth incentivizes her to invest more in $\boldsymbol{x}^*_H$ and fewer in $\boldsymbol{x}^*_L$.

It is important to note that a principal can adjust a local leader's preference for long-term economic growth, δ, by changing her own preference, λ. For example, if the principal cares

more about education investment, she could include education investment in the agent's performance evaluation to incentivize the latter to focus more on education expenses.

4.2.3 Discussion

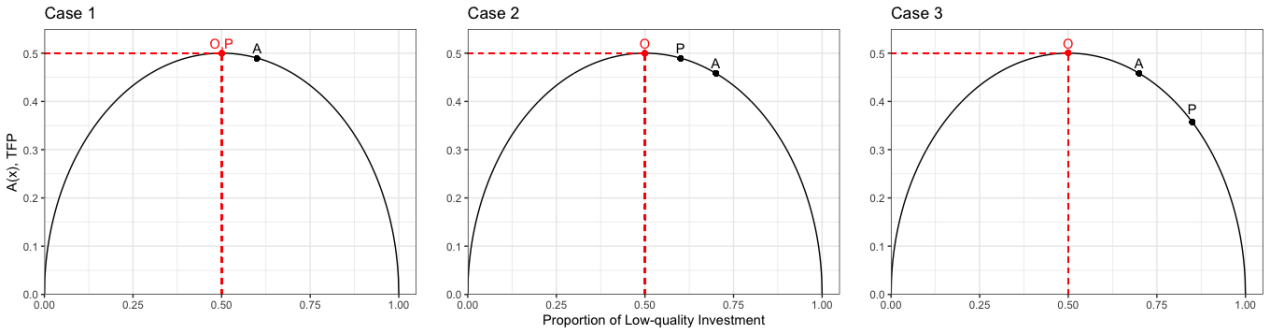
The above model yields one important result worthy of separate discussion. North et al. (1990) and Acemoglu, Johnson and Robinson (2005) demonstrated that institutions shape the incentives of political actors and cause differences in economic development across countries. They further argue that societies with institutions resulting in the efficient allocation of resources tend to enjoy persistent economic development. The theoretical model presented above helps me identify two potential efficiency losses in a political promotion system by comparing the optimal economic allocation of resources, the principal's best allocation, and the optimal political combination of resources for subnational leaders.

Let MC_H and MC_L represent the marginal cost of investing in high and low-quality projects. The optimal economic combination of resources can be calculated by combining equations 4.2 and 4.3 and taking the first-order condition. Meanwhile, define MC_i^P as the marginal cost for each type of investment under the principal's preferred optimal allocation. Then, the principal's best allocation is calculated by taking the derivative of equation 4.5. Lastly, the local leader's optimal political allocation is obtained based on Proposition 1, and I use MC_i^A to represent the marginal cost for each type of investment for local leaders. I present resource combinations under each condition as the following.

- Optimal Economic Allocation: $\frac{\rho}{1-\rho}\frac{x_L}{x_H} = \frac{MC_H}{MC_L}$
- Principal's Best Allocation: $\frac{\lambda}{1-\lambda} = \frac{MC_H^P}{MC_L^P}$
- Optimal Political Allocation: $\frac{\tau_H}{\tau_L} = \frac{MC_H^A}{MC_L^A}$

To establish a link between resource allocation and long-term economic growth potential, I build upon the theoretical framework presented by Jones (2011) on resource allocation and productivity, the latter being identified as a key determinant of long-term economic growth potential. Let $x = \frac{x_H}{\bar{x}}$ and $\bar{x} = x_L + x_H$. Substituting x and $\bar{x}$ to equation 4.2, I obtain the following equation, where $A(x)$ is the total factor productivity (TFP).

Figure 4.1: Resouce Allocation and TFP



$$A(x) = x^{\rho}(1-x)^{1-\rho} \tag{4.13}$$

Equation 4.13 illustrates the relationship between the level of TFP and resource allocations. It can be demonstrated that the highest TFP is achieved when resources are utilized in the optimal economic combination. Any deviation from this optimal allocation results in a reduction of TFP.

Building on this relationship, I identify two potential sources of efficiency loss stemming from a multi-layered government structure and visualize them in Figure 4.1. O represents the optimal economic allocation, P stands for principal preferred allocation, and A represents the agent's preferred allocation. The first source of efficiency loss is due to the classic "agency failure," as illustrated in all cases of Figure 4.1, where the local leaders' preferred allocation of resources does not align with the preferences of their principal. Even in instances where the principal's preferences do coincide with the optimal economic allocation of resources (as shown in Case 1), the political incentives of local leaders can lead them to allocate more of resource x_L, consequently reducing TFP.

The second is "institutional failure." In the model, the principals oversee the promotion of their subordinates, and their preference for low-quality investment directly influences the agents' resource allocation (which can be achieved by changing δ). Because there are no guarantees that the principal's preferred allocation aligns with the optimal economic

allocation. When the principal also favors allocating more resources to x_L, as depicted in Case 2 of Figure 4.1, such preferences combined with the political incentives of local leaders motivate the latter to depart even further from the optimal economic allocation. For example, suppose the optimal economic allocation of investment to the real estate sector is 50% of a society's total resources, but the principal prefers 60% and uses that as a performance measure to evaluate subordinates. Then, based on proposition 2.1, subnational leaders would be incentivized to invest more than 60%, leading to an even greater deviation from the optimal allocation.

A counter-intuitive finding is that economic efficiency can sometimes be improved by reducing the principal's influence over their subordinates' decisions, especially when the principal's preferences significantly diverge from both the optimal allocation and the agents' preferred allocation. This is illustrated in Case 3 of Figure 4.1. For example, if the principal prefers allocating 85% of resources to x_L, while agents prefer a 70% allocation, increasing the principal's authority to monitor and punish agents could pull the agents' allocation to a point below P. However, granting agents more autonomy in their decision-making can, in fact, lead to an allocation that results in higher TFP.

4.2.4 Testable Hypotheses

Based on the above theoretical discussion, I formulate the following testable hypotheses:

Hypothesis 4.1 (Proposition 2.1)**.** *When the principal's allocation preference is fixed, local leaders tend to invest more in low-quality investments and less in high-quality investments as the information asymmetry between local leaders and their principals increases.*

$\triangle$ represents the difference in utility for local leaders between being promoted and not being promoted. This suggests that when local leaders have strong career incentives, they perceive this difference as significant; conversely, when career incentives are weak, they perceive the difference as small. Based on this understanding, I propose the following hypothesis.

Hypothesis 4.2 (Proposition 2.2)**.** *Conditional on the level of information asymmetry, increasing local leaders' career incentives motivates them to invest more in low-quality investments, but less in high-quality investments.*

Finally, δ quantifies local leaders' preference for high-quality investment. The model assumes that this parameter can be influenced by the principal's resource allocation preferences. Therefore, when a principal favors low-quality investment over high-quality investment, I propose the following hypothesis.

Hypothesis 4.3 (Proposition 2.3)**.** *Conditional on the level of information asymmetry, an increase in principals' preference for low-quality investments encourages local leaders to allocate more resources to low-quality investments and fewer resources to high-quality investments.*

4.3 Geographic Distance and Information Asymmetry

The variances of the two types of investment are key elements in the theoretical model. Therefore, it is important to discuss how to identify their variation.

It should be noted that the variances in development investment capture the precision of information that local leaders can use to signal their capabilities. Therefore, the higher the information asymmetry between local leaders and their principals, the lower the precision of information from high-variance development investments. Accordingly, I can leverage the intensity of information asymmetry to identify the variation in the precision of information across different development investments.

Building on the literature on geography, political accountability, and development, I employ the distance between a locality and its regional political capital to measure information asymmetry (Stasavage, 2010; Campante and Do, 2014; Brinkerhoff, Wetterberg and Wibbels, 2018). Intuitively, the geographic distance between localities where lower-level politicians conduct their daily work and the places where their superiors are located captures the extent of information asymmetry. When regions are farther from political centers, the problem of information asymmetry becomes more severe, while shorter distances result in fewer issues caused by information asymmetry.

Specifically, geographical distance impacts information asymmetry through at least two channels. The first is media coverage. Newspapers are more likely to cover political issues

in areas closer to capitals, while regions farther away receive less attention (Campante and Do, 2014). As a result, principals are often better informed about issues in their immediate surroundings and less knowledgeable about the true economic conditions and activities in more distant localities.

The second channel involves the cost of monitoring and communication (Müller-Crepon, 2021). Principals frequently employ a mix of incentives and sanctions to control their subordinates. However, both methods depend on effective monitoring and clear communication. The greater the geographical distance between a principal and their agents, the more resources the former must invest in enhancing monitoring capabilities. Information asymmetry becomes particularly problematic when a principal lacks the resources to adequately monitor agents, which is a common scenario in developing countries (Stasavage, 2005; Krishna and Schober, 2014). Although advances in modern communication technologies have significantly lowered the cost of accessing information, they have also increased the challenges of verifying information and discerning its accuracy. Consequently, the overall cost of acquiring reliable information may still be prohibitively high.

4.4 Development Policies

Considering the impact of economic performance on promotion chances, local political leaders are motivated to strategically direct economic resources towards activities capable of fostering rapid economic growth, thus effectively signaling their competencies. One approach to achieving this is by investing in fixed assets, with a particular emphasis on real estate. Real estate investment significantly contributes to local economic growth through various channels. First, the real estate sector is labor-intensive, creating numerous employment opportunities. Second, a thriving real estate market boosts the demand for construction materials, thereby benefiting various sectors of the economy. Lastly, the real estate market attracts investment from outside, as investors search for property market opportunities. This influx of external capital can substantially enhance the local economy, driving its growth and development.

I use human capital investment, measured by education expenses per capita, as a form of high-quality development investment. Human capital investment is vital for increasing long-term economic growth potential, notably for its role in facilitating research and innovation, which, in turn, boosts productivity (Aghion and Howitt, 2008). Despite its importance, political economists often view human capital investment as less appealing to subnational leaders due to the significant time investment required, the need for complex coordination across various sectors, and the challenge of linking the outcomes directly to specific local leaders (Stasavage, 2005; Mani and Mukand, 2007; Harding and Stasavage, 2014).

4.5 Data and Variables

Independent Variable: The main independent variable is the *intensity of information asymmetry* between city and provincial leaders. To measure this information asymmetry, I use the distance between a city and its provincial capital as a proxy variable. Moreover, to add within-group variation for cities with the same distance to their respective provincial capitals, I also incorporate the average terrain ruggedness between cities and provincial capitals into the information asymmetry measure. The rationale behind this is that, for cities that share the same distances to provincial capitals, the areas of greater ruggedness are harder to access, thus leading to increased information asymmetry.

To construct this variable, I first obtained raw elevation raster for the Chinese territory from NASA's Shuttle Radar Topography Mission (SRTM). It has a resolution of 3 arc-seconds (approximately representing a grid cell about 66 meters wide by 93 meters tall at a latitude of 45^0.) and each grid cell on the raster contain the elevation above sea level in meters. I then use the open source GIS software, QGIS, to calculate the Terrain Ruggedness Index (TRI) for each cell based on its adjacent 8 cells. Next, I map the distance from a city to its provincial capital to the raster that contains TRI and extract TRI along the route. Finally, I calculate the average TRI along the path and multiply it by the distance between cities' and capitals' centroids, and take the logarithm. This means areas of greater ruggedness with longer distances experience higher information asymmetry. The left side of Figure C3 shows

the TRI profile for different distances and the right side shows the intensity of information asymmetry when distance increases. Generally, this proxy variable captures the idea that the longer the distance, the higher the information asymmetry.

To construct the career incentives of provincial and prefecture-level party secretaries, I collect their biographical information from Jiang (2018). As discussed in Chapter 1, prefecture party secretaries become ineligible for promotion once they reach the age of 57. For provincial-level leaders, the age of ineligibility for promotion is 63. These age thresholds serve as indicators of shifts in the career incentives of political leaders. Therefore, I define two dummy variables to be equal to one when a provincial and a prefecture party secretary are under the ages of 63 and 57, respectively.

Dependent Variable: The first dependent variable is total factor of productivity, measured by Malmquist Productivity Index. This index is calculated based on the data envelopment analysis frontier, as suggested by Ray and Desli (1997), and is commonly employed to evaluate the performance of firms, industries, or countries. The core concept involves estimating the distance of a unit's performance over time in comparison to a best practice frontier. A Malmquist Productivity Index greater than 1 signifies a productivity improvement, laying the foundation for sustained economic expansion over time. A value less than 1 indicates a decline. A value of exactly 1 means that productivity has remained unchanged over the analyzed period. Figure C4 in the Appendix shows the distribution of estimated productivity.

To measure investment in the real estate sector and education, I utilize real estate investment per capita and education expense per capita. These metrics are constructed based on data from prefectures' Statistical Yearbooks. The investment in real estate includes investment in construction and investment in equipment and tools for construction, representing the completed investment in real estate development for a given year. The investment in education encompasses items such as the construction and maintenance of schools, teacher salaries, and scholarships and financial aid for students.

I also construct a battery of control variables on city leaders' personal characteristics, such as age, education, years of party membership, sex, and ethnicity. In addition, I control for prefecture-level economic variables in various model specifications such as GDP per capita,

population, FDI, and fiscal revenue. I am able to collect political and economic information on roughly 320 of China's 333 prefecture-level jurisdictions between 2000 and 2015. Table C1 and C2 in the Appendix provide summary statistics.

4.6 Empirical Results

This section presents empirical evidence supporting the theoretical arguments. First, I establish that real estate investment has a negative impact, whereas education investment has a positive impact on local productivity between 2002 and 2015. Second, I provide empirical evidence on "agency failure," showing that, with provincial leaders' preferences held constant, prefecture leaders tend to invest more in the real estate sector to stimulate short-term economic growth and less in education expenses fostering long-term growth when information asymmetry increases. Third, I demonstrate the career incentive effects of local politicians. Finally, I provide empirical evidence on the "amplifying effect." I illustrate how changes in principals' preferences for low-quality investment directly affect local resource distribution.

4.6.1 Determinants of Productivity

To investigate the influence of different types of development policies on productivity, I use the following fixed effect model.

$$\text{Productivity}_{c,t} = \beta_1 \text{Investment}_{c,t} + \Gamma X_{c,t} + \lambda_c + \mu_t + \epsilon_{c,t} \tag{4.14}$$

The productivity of city c in year t is measured by Malmquist Productivity Index. $\text{Investment}_{c,t}$ denotes the investment in either the real estate sector or education for city c in year t at the per capita level. $X_{c,t}$ represents a set of city-level control variables, including the percentage of primary industrial output in total GDP, the total population, and fixed asset investment. λ_c and μ_t represent city and year fixed effects, respectively.

Table 4.2 shows the results. For each type of investment, I present two models: the first model excludes control variables, while the second model incorporates all city-level controls.

All independent variables are standardized. Therefore, the results should be interpreted as the effect of a one standard deviation change in the independent variables on TFP.

Column (1) illustrates that a one standard deviation increase in real estate investment results in a 0.018 decrease in productivity. This negative impact increases to 0.24 when incorporating all control variables. Conversely, the findings in columns (3) and (4) highlight a contrasting effect of education investment on TFP. Specifically, a one standard deviation increase in education investment, equivalent to an improvement of 103 RMB ($\approx$ \$15) per capita, leads to increases in TFP by 0.041 and 0.071, respectively. [27] Overall, the results indicate that real estate investment tends to diminish productivity over time, while investment in human capital enhances productivity. In the subsequent sections, I explore the motivations behind local leaders' preference for investing in the real estate sector.

4.6.2 Information Asymmetry and Resource Allocation

To investigate the hypothesis that local leaders tend to allocate resources towards low-quality investments and less towards high-quality investments as information asymmetry between them and their principals increases, I employ the following model.

$$\text{Development Invest}_{c,t} = \beta_1 \text{Information Asymmetry}_c + \Gamma X_{s,t} + \Theta Z_{c,t} + \lambda_{p,t} + \epsilon_{c,t} \tag{4.15}$$

In equation 4.15, Development Invest$_{c,t}$ represents the resources allocated to one of the development investments in the prefecture c, at year t. Information Asymmetry$_c$ stands for the information asymmetry for city c. $X_{s,t}$ is a set of personal-level controls for the part secretary, s, and $Z_{c,t}$ is a set of city-level time-variant controls. $\lambda_{p,t}$ is province-by-year fixed effects. The key analytical interest of this chapter is the parameter β_1, which measures the effects of information asymmetry on resource allocation. By incorporating province-by-year fixed effects, I am able to explore the impact of information asymmetry on resource allocation within the same province and year, thereby controlling for provincial-level preferences.

Table 4.3 presents the findings. Both independent and dependent variables are standardized. The results in column (1) indicate that a one standard deviation increase in

[27] Exchange rate: \$1 = 7 RMB.

Table 4.2: Development Policies and Productivity

	TFP			
	(1)	(2)	(3)	(4)
Real estate	-0.018***	-0.024***		
	(0.006)	(0.008)		
Human capital			0.041**	0.071***
			(0.020)	(0.021)
Dep. var. mean	0.97	0.97	0.97	0.97
# of observations	3599	3582	3582	3582
Adjusted R^2	0.01	0.02	0.02	0.03
Year FE	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes

Note:

[1] Fixed effect models contain prefecture-level control variables: the percentage of primary industrial output in total GDP and total population. In models (1) and (2), they also have total education and science investment while in models (3) and (4), they have total fixed investment as control variables.

[2] Standard errors clustered by cities in parentheses, *p<.10; **p<.05; ***p<.01.

information asymmetry corresponds to a 0.036 standard deviation increase in real estate investment. This relationship holds even after incorporating all city-level and individual-level control variables. In columns (3) and (4), the analysis shows that a one standard deviation increase in the information asymmetry index results in a decrease in education investment by 0.04 and 0.05, respectively.

Overall, these results show a pattern in which, as information asymmetry increases, local leaders invest more in low-quality investments that can rapidly increase their promotion chances, while allocating fewer resources to projects that increase the total size of the econ-

omy but require a long time to complete, involve complex coordination, and are not easy to demonstrate their abilities. This confirms Hypothesis 4.1.

Table 4.3: Information Asymmetry and Development Policies

	Real Estate		Human Capital	
	(1)	(2)	(3)	(4)
Information asymmetry	0.036***	0.037***	-0.044**	-0.050***
	(0.009)	(0.010)	(0.017)	(0.019)
# of observations	3941	3492	3232	2958
Adjusted R^2	0.60	0.54	0.60	0.57
Province and Year FE	Yes	Yes	Yes	Yes
Econ Controls	Yes	Yes	Yes	Yes
Politician Controls	No	Yes	No	Yes

Note:

[1] Fixed effect models contain prefecture-level control variables: GDP per capita, total population, and the percentage of primary industrial output in total GDP. They also include politicians' characteristics: connection with provincial leaders, age, gender, level of education, and tenure at current positions.

[2] Standard errors clustered by provinces in parentheses, *p<.10; **p<.05; ***p<.01.

4.6.3 Career Incentives and Resource Allocation

To examine Hypothesis 4.2, I employ a difference-in-discontinuity design, as outlined by He, Wang and Zhang (2020). This approach integrates an interaction between the information asymmetry index and the career incentive dummy variable within a regression discontinuity framework. This specification allows for the identification of "breaks in trends" by comparing changes in discontinuities associated with the career incentives of prefecture leaders (Grembi, Nannicini and Troiano, 2016; Giambona and Ribas, 2022). The model specification is as follows:

$$\begin{aligned}\text{Development Invest}_{s,c,t} = {} & \beta_1 \text{Age Dummy}_{s,c,t} + f(D_{s,c,t}) + f(D_{s,c,t}) * \text{Age Dummy}_{s,c,t} \\ & + \text{Information}_c * f(D_{s,c,t}) + \beta_2 \text{Information}_c * \text{Age Dummy}_{s,c,t} \\ & + \text{Information}_c * f(D_{s,c,t}) * \text{Age Dummy}_{s,c,t} + \theta \Omega_{c,t} + \epsilon_{s,t} \\ & \forall D_{s,c,t} \in (-h, h)\end{aligned} \tag{4.16}$$

I employ a parametric approach with a uniform kernel across all specifications to estimate the model. The term $\text{Age Dummy}_{s,c,t}$ serves as an indicator for the career incentives of the party secretary s in city c at year t, set to one if the party secretary's age is below 57. The function $f(D_{s,c,t})$ represents a flexible control for the distance in years to the age cutoff. In line with recommendations from Gelman and Imbens (2019), I adopt a local linear approach. Ω denotes the vector of control variables, while h is the age bandwidth, determined by the method proposed in Calonico, Cattaneo and Titiunik (2014). According to their algorithm, the MSE-optimal bandwidth is 5.6. I choose bandwidth 6 in my specifications. β_2 is the analytical interest in this model.

Results are reported in Table 4.4. Columns (1) and (2) illustrate that among local leaders who face identical information asymmetry, those with higher career incentives invest 0.042 standard deviations more in the real estate sectors compared to their counterparts with lower career incentives. Conversely, they invest 0.05 standard deviations less in education. The empirical findings remain consistent after incorporating economic control variables, such as GDP per capita, and political control variables, including the political connections of politicians with provincial leaders. Overall, the statistical evidence indicates that within a

multi-layered government structure, the promotion incentives of local leaders skew resource allocations away from high-quality investments that are crucial for long-term economic development. This finding confirms Hypothesis 4.2.

Table 4.4: Career Incentive Effect

	Real Estate		Human Capital	
	(1)	(2)	(3)	(4)
Information*Career	0.042**	0.042**	-0.050**	-0.049**
	(0.023)	(0.020)	(0.023)	(0.023)
# of observations	2588	2588	2566	2566
Adjusted R^2	0.53	0.53	0.55	0.55
Province and Year FE	Yes	Yes	Yes	Yes
Econ Controls	Yes	Yes	Yes	Yes
Politician Controls	No	Yes	No	Yes
Kernel Type	Uniform	Uniform	Uniform	Uniform

Note:
[1] Prefecture-level economic control variables include GDP per capita and the percentage of primary industrial output in total GDP. They also include politicians' characteristics: connection with provincial leaders, gender, level of education, and tenure at current positions.
[2] Standard errors clustered by provinces in parentheses, *p<.10; **p<.05; ***p<.01.

4.6.4 Career Incentives of Principal

Finally, I explore the effect of institutional failure, specifically how changes in preferences among principals can further distort resource allocation. The statistical model used is as follows:

$$\begin{aligned}\text{Development Invest}_{c,t} = \beta_1 Career\ Incentive_{ps,t} + \beta_2 Career_{ps,t} * Information_c \\ + \Gamma X_{s,t} + \Theta Z_{c,t} + \lambda_c + \mu_t + \epsilon_{c,t}\end{aligned} \tag{4.17}$$

Where $Career\ Incentive_{ps,t}$ represents the career incentive of the provincial party secretary ps in year t. It is a dummy variable equal to 1 when the age of a provincial party secretary is below 63. $Information_c$ denotes the information asymmetry index. $X_{s,t}$ represents a battery of personal-level controls for the party secretary s, and $Z_{c,t}$ is a set of city-level time-variant controls. λ_c and μ_t represent city and year fixed effects, respectively.

Table 4.5: Career Incentive Effects of Provincial Leaders

	Real Estate		Human Capital	
	(1)	(2)	(3)	(4)
Career incentive	0.002	0.011	-0.021	-0.033*
	(0.019)	(0.019)	(0.033)	(0.018)
Information*Incentive	0.043***	0.037***	-0.189***	-0.093***
	(0.012)	(0.012)	(0.028)	(0.014)
# of observations	3928	3863	3865	3831
Adjusted R^2	0.67	0.68	0.25	0.66
City FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes

Note:

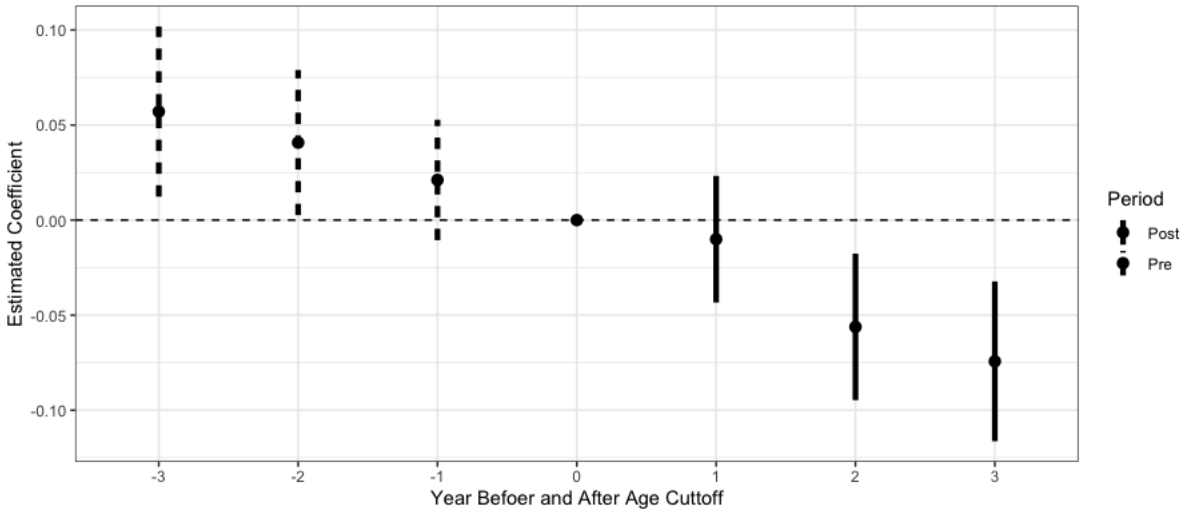
[1] Prefecture-level economic control variables include GDP per capita and the percentage of primary industrial output in total GDP. They also include politicians' characteristics: connection with provincial leaders, gender, level of education, and tenure at current positions.

[2] Standard errors clustered by provinces in parentheses, *p<.10; **p<.05; ***p<.01.

The results in columns (1) and (2) of Table 4.5 indicate that career incentives for provincial leaders lead to a 0.043 standard deviation increase in real estate investment among localities subject to the same information asymmetry. Conversely, the results from columns (3) and (4) demonstrate that these same career incentives result in a decrease in education investment by 0.189 standard deviations.

Figure 4.2 illustrates the dynamic impact of career incentives on real estate sector in-

Figure 4.2: Dynamic Effects of Career Incentives on Real Estate Investment



vestment three years before and after the age cutoff for promotion eligibility. It clearly shows that before the age cutoff of 63, provincial leaders demonstrate a preference for more real estate investments, motivated by their pursuit of career advancement. This preference then extends to prefecture-level politicians, leading to an increase in real estate investments. However, immediately following the loss of career incentives, there is a noticeable decline in such investments.

4.6.5 Robustness Checks

I perform several robustness checks and placebo tests to validate the main findings. First, I use the change in technical efficiency from the Malmquist Productivity Index to measure productivity. The results are shown in Table C3 in section C.2.1. Second, I modify the measure of information asymmetry to the road distance between prefectures and provincial capitals. The results are presented in Table C4 in the Appendix. Additionally, I conduct a placebo test using the distance between prefectures and the capitals of their nearest provinces, discussed in section C.2.2. Third, I assess the robustness of the RD design by applying a different kernel and bandwidth. Details can be found in section C.2.3. Finally,

I conduct two placebo tests concerning the impact of provincial leaders' career incentives. Overall, across all robustness checks, the findings consistently align with those reported, and the placebo tests yield null results.

4.7 Conclusion

This chapter provides both theoretical arguments and empirical evidence on how information asymmetry in a multi-layered government influences political leaders' allocation of resources across different development investments. I calculate the optimal resource allocations for the economy, the principal, and subnational leaders. Based on this, I identify two efficiency losses in the political promotion system. The first is due to "institutional failure," whereby the principal fails to design policies that achieve optimal economic allocation. The second is "agency failure," where local leaders' optimal political allocations of resources are misaligned with those of the principal. The most significant prediction based on the model is an "amplifying effect," where institutional failure exacerbates agency failure.

My empirical findings reveal that within a political promotion system, information asymmetry encourages subnational leaders to skew resource allocation towards low-quality investments that can boost short-term economic growth, at the expense of investing in education that could foster innovation and sustain long-term economic development. Moreover, this inclination is particularly strong among leaders with significant career incentives. Additionally, the career incentives of political principals further exacerbate the shift in resource allocation towards these low-quality investments. Consequently, regions affected by substantial resource misallocation show lower productivity levels.

Appendix A First Appendix

A.1 Summary Statistics

This section presents summary statistics for political leaders, land attributes, and survey respondents. The author collects land data, while data on party secretaries comes from Jiang (2018), and survey data is obtained from the Chinese Family Panel Survey (CFPS).

A.1.1 Political Leaders

Panel A in Table A1 presents descriptive statistics for prefecture party secretaries. The variable Promotion is a dummy variable set to one to indicate whether a party secretary was promoted in a given year, based on whether that individual was promoted to a vice-provincial position with an active role. Start age refers to the age at which individuals assume the role of party secretaries. The variable College is binary, indicating whether party secretaries possess a college degree. Similarly, variables representing state enterprise experience and Communist Youth League are binary, with a value of 1 indicating the presence of such prior working experiences among politicians. Furthermore, the variable Sex is binary, with a value of 1 corresponding to male politicians. Ethnicity is also represented as a binary variable, with a value of 1 denoting Han ethnicity. In this study, two commonly adopted measures are utilized to assess patronage between city leaders and their provincial superiors. These measures align with established methodologies in the literature on Chinese political selection. The first measure emphasizes the promotion of subordinate officials during their superiors' tenure as an indicator of informal ties (Landry, Lü and Duan, 2018; Jiang, 2018). The second measure, referred to as "Homophily," underscores the shared experiences between lower-ranking officials and their superiors (Shih, Adolph and Liu, 2012; Jia, Kudamatsu and Seim, 2015; Opper, Nee and Brehm, 2015). Such shared experiences encompass factors such as a common place of birth, attending the same university, or periods of collaborative work within the same government or party branches. Finally, I include several city-level statistics,

such as the average GDP growth rate, GDP per capita, and the total amount of FDI.

A.1.2 Land

Panel B in Table A1 presents summary statistics concerning land characteristics at the transaction level. I collected the raw nighttime light data from the Defense Meteorological Satellite Program (DMSP) for the years 2000 to 2012 and the Visible Infrared Imaging Radiometer Suite (VIIRS) for the years 2012 to 2015. In addition, I obtained the population distribution data at approximately 1 km resolution from the WorldPop website and cropped it based on China's administration boundaries. Moreover, I gathered the geographic information from SRTM digital elevation data at a resolution of 3 arc-second (approximately representing a grid cell of roughly 66 meters wide by 93 meters tall at 45^0 latitude.). I calculated the land ruggedness at the grid cell level based on elevation data. Finally, I extracted nightlight density, population estimation, land elevation, and ruggedness for each piece of land based on a 1 km buffer from these data sources.

Land quality, assessed by the local government, is an overall evaluation of a parcel of land based on the area's economic prosperity, population density, traffic conditions, and infrastructure conditions. According to the Land Resources Bureau's criteria, there are fifteen levels of land quality. Level one represents the highest land quality, such as land in Shanghai and Beijing's central business district, whereas level fifteen represents the lowest land quality.

A.1.3 Survey Respondents

Table A2 presents summary statistics pertaining to the survey respondents. In Table A2, I provide the mean values and differences between respondents who have undergone land expropriation and those who have not.

Examining individual characteristics, the statistical summary indicates that individuals who have experienced land expropriation tend to have lower incomes and are less likely to be members of the communist party or employed by the government. These findings underscore a systematic bias in land expropriation by local governments towards low-income families

and citizens with fewer government affiliations.

Furthermore, mean difference tests reveal that survey respondents who have encountered land expropriation are more inclined to report conflicts with local authorities, exhibit lower levels of trust in and assessment of local government performance. Additionally, they tend to perceive a higher level of corruption within the Chinese political system.

A.2 Estimating Ex-ante Promotion Probability

Table A3 presents estimations for the ex-ante promotion probabilities of local party secretaries. In the chapter 2, I utilize results from the generalized kernel regularized least squares (gKRLS) model to construct the career incentive index, while in the Appendix section A.3, I employ results from a probit model as a robustness check. gKRLS is a kernel method that helps researchers explore the non-linear relationships between independent variables without imposing a specific functional form for estimating the model. A detailed treatment of this method can be found in Chang and Goplerud (2023).

The results in the gKRLS column display the marginal effects of variables. The negative coefficient for Start age indicates that the older individuals are when they assume the role of party secretaries, the less likely they will be promoted. This finding aligns with the age limit for promotion rule in the Chinese political system (Kostka and Yu, 2015). Interestingly, neither of the patronage measures exhibits a statistically significant effect on the promotion of local leaders. Moreover, in line with existing literature, local leaders with prior experience in the Communist Youth League are more likely to be promoted (Fang, Li and Wu, 2022). Finally, the results suggest that average GDP growth has a positive effect on the probability of promotion. However, it is not statistically significant.

Finally, I use the estimation results to predict the ex-ante promotion probabilities to construct the career incentive index. Figure A1 shows the distribution.

A.3 Robustness Check for Career Incentive Effects

This section provides several robustness checks for the effects of career incentives on land prices. Firstly, I examine several plausible alternative explanations. Then, I re-estimate the main results using the career incentive index constructed by a probit model. Finally, I conduct a placebo test using a permutation test.

A.3.1 Alternative Explanations

I initially investigate whether corruption, rather than economic performance, motivates local leaders to manipulate residential land prices. Research by Cai, Henderson and Zhang (2013) and Chang (2023) suggests that local political leaders are less likely to utilize the English auction method to sell land if corruption is the primary motivation.

There are four auction methods for selling a piece of land in China: English auction (*paimai*), two-stage auction (*guapai*), invited bidding (*zhaobiao*), and bilateral agreement (*xieyi*). An English auction is the most transparent method as it is open to the public and requires at least three bidders. A two-stage auction is less transparent because all potential buyers must obtain permission from local governments to participate, and all bidders sequentially bid for a piece of land anonymously in the first stage, providing local governments with opportunities to manipulate land prices. Invited bidding and bilateral agreement auctions are even less transparent than a two-stage auction. Local governments have the authority to decide who qualifies to participate in auctions, and the auction process is entirely under-the-table. The public has no information on why a potential buyer is selected or how land prices are determined.

As the English auction is the most competitive method, local governments are more likely to choose this approach when they aim to generate higher revenue from land sales. I define an auction dummy variable as equal to 1 when a piece of land is sold via an English auction.

Table A4 presents the results. Across all model specifications, I find that a one-standard deviation increase in career incentives of local leaders leads to a 1% increase in the likelihood

of using the English auction method to sell land. These results suggest that corruption is less likely to be the main driver of land price manipulation.

I further investigate whether fiscal pressure, measured by the total within-budget fiscal deficit, FDI, measured by total amount of foreign direct investment received, and land supply, indicated by total number and total area of residential land sold each year, will influence the career incentive effect.

Table A5 presents all results. I utilize models with all control variables and explore both within-city and cross-border variations. The results indicate that, after controlling for these factors, the effect of career incentives remains positive and statistically significant.

A.3.2 Results Based on Probit Model

To demonstrate that the effects of career incentives on land prices are not sensitive to the specific method of constructing such an index, I use results from a probit model as a second approach. The results are shown in Table A6. Compared with the estimations in Table 2.1, the career incentive effects in Table A6 are slightly higher. Moreover, across all model specifications, the results are positive and statistically significant, which is consistent with theoretical expectations.

A.3.3 Placebo Test

Finally, I conduct a permutation test as a placebo test. The procedures are as follows:

1. Calculate the empirical probability distribution based on the ex-ante promotion probability estimated in section A.2.
2. Based on the computed probabilities, randomly sample career incentives and assign them to party secretaries.
3. Re-run the main analysis using these modified career incentives.
4. Run the simulation 500 times. During each iteration, record the coefficient values for career incentives.

Figures A2 plot the empirical distribution of estimated coefficients obtained from the simulation results. Most of the placebo coefficients are in the range of -5 to 5. The promotion incentive effect in the chapter 2 is about 29-51 per square meter depends on model specification. This value significantly greater than the estimated placebo coefficient shown in Figure A2, lending substantial support that my main findings are not influenced by unobserved variables.

A.4 Sensitivity of Mediation Analysis

The causal mediation analysis presented in the chapter 2 crucially depends on the sequential ignorability assumption. This assumption stipulates that: 1) once conditioned on covariates, there are no confounding variables affecting the estimation of the effects of career incentives on land prices, and 2) after accounting for the career incentives and observed covariates, there are no confounding variables affecting the estimation of the outcome model. However, this assumption is often untestable with observational data. As a result, researchers must perform sensitivity analyses to evaluate how potential violations of this assumption could influence the study's conclusions.

I conducted several sensitivity analyses following the approach outlined by Imai et al. (2011). This method involves plotting the Average Causal Mediation Effects (ACME) against the values of the sensitivity parameter ρ, which represents the correlation between the error terms in the mediator and outcome models. Essentially, ρ indicates both the magnitude and direction of the unobserved confounding factor between land prices and protests. However, due to the current software limitations that do not support continuous treatment variables in sensitivity analysis, I employed binary values for treatment variables, where 0 represents local officials with no career incentives and 1 represents those with the highest career incentives.

The results of the causal mediation analysis are illustrated in Figure A3. It's crucial to highlight that the proportion of protests mediated through an increase in land prices remains consistent with what is reported in the chapter 2, even if the direct and mediation effects differ. Figure A4 reports results for sensitivity analysis.

The solid curve displays the Average Causal Mediation Effect (ACME) by varying ρ, whereas the dashed line indicates the estimated average causal mediation effect when ρ equals zero, signifying that the sequential ignorability assumption holds. This value should align with the mediation effect reported in Figure A3. The intersection of the ACME curve and the horizontal solid line marks the ρ value at which the ACME equals zero. For instance, in the model where the outcome variable is total protest, the ACME reaches zero when ρ is 0.35. This indicates the presence of an unobserved confounder that influences both land prices and protest in the same direction, resulting in a correlation between the two error terms greater than 0.35, which is relatively robust to unobserved confounding.

A.5 Additional Results and Placebo Test for Political Consequences

Building on the theoretical framework discussed in the chapter 2, distributional injustice is argued to impact not only citizens' conflicts with local authorities but also their broader political attitudes, including trust in and evaluation of the government. Consequently, I conduct additional analyses using political trust and government performance evaluation as dependent variables. These variables were derived from responses to specific questions:

1. How much you trust local government officials. An eleven-scale variable with 0 indicating the lowest and 10 representing the highest.
2. How would you rate the performance of the county/district government last year. A five-scale variable with 1 meaning a lot of achievement and 5 meaning even worse than before. I recoded the value so that 1 represents even worse, and 5 indicates a lot of achievement.

The results are presented in Table A7. The estimations in Panel A indicate that a one standard deviation increase in the compensation gap leads to a 0.11 decrease in political trust towards the local government. However, these estimates are not statistically significant across all model specifications. Meanwhile, the findings in Panel B demonstrate a statistically significant effect of under-compensation on citizens' evaluations of local govern-

ment performance; a one standard deviation increase in the compensation gap leads to a 0.1 decrease in the evaluation of local government.

Overall, the impact of compensation injustice on citizens' political behaviors extends beyond the propensity for conflict, suggesting a broader effect on regime stability.

Finally, to further confirm that land compensation injustice is the catalyst for political conflicts between citizens and local authorities, I conduct a placebo test with outcome variables that should not be influenced by the treatment variable. For this purpose, I selected survey respondents' answers regarding trust in the United States and in strangers. The results are reported in Table A8. In summary, I observed no effects of the compensation gap on these two outcome variables, indicating that the observed effects in conflict are likely not due to spurious correlations.

Table A1: Summary Statistics of Land and Politicians

Variable	Mean	Std.Dev.	Obs
Panel A: Politicians			
Promotion	0.07	0.25	5272
Start Age	50.35	3.81	5160
Age	51.96	3.90	5160
College	0.55	0.50	5263
State Enterprise Exp	0.16	0.37	5272
The Communist Youth League Exp	0.17	0.38	5272
Sex	0.92	0.26	5531
Ethnicity	1.91	0.29	5239
Patronage(Promotion)	0.63	0.48	5272
Patronage(Homophily)	0.22	0.42	5272
Ave GDP Growth	0.10	0.04	4459
GDP per capita	9.56	0.80	4469
FDI	9.13	1.98	4457
Fisical Revenue	12.98	1.24	3656
Panel B: Land			
Price(Yuan/m^2)	940.51	1604.17	423748
Land Quality	3.76	3.90	423748
Night Lights	3.63	0.48	423748
Population Density	7.96	1.09	423748
Size(m^2)	16350.97	657199.48	423748
Disance to City Center	9.92	1.86	423748
Distance to Railway Station	2.73	1.46	423748
Terrain Ruggedness	2.03	0.77	423154

Table A2: Summary Statistics of Survey Data

	No Exp Mean	Exp Mean	Difference in Means
Age	45.160	44.337	-0.903***
	(16.969)	(16.694)	(0.226)
College Degree	0.029	0.016	-0.012***
	(0.168)	(0.127)	(0.002)
Gender	0.499	0.500	0.002
	(0.500)	(0.500)	(0.003)
Party Member	0.074	0.049	-0.026***
	(0.262)	(0.216)	(0.003)
Work for Gov	0.106	0.079	-0.027***
	(0.434)	(0.374)	(0.006)
Annual Income (RMB)	11171.266	10042.436	-1,125.881***
	(45983.396)	(19901.584)	(367.256)
Homeowner	0.879	0.901	0.022***
	(0.326)	(0.298)	(0.008)
Urban	0.425	0.452	0.028
	(0.494)	(0.498)	(0.023)
Compensation Gap (RMB)	0.000	656.018	663.239***
	(0.000)	(874.176)	(23.829)
Conflict with Gov	0.071	0.093	0.022***
	(0.257)	(0.291)	(0.004)
Trust of Gov	5.012	4.859	-0.159***
	(2.603)	(2.601)	(0.046)
Evaluation of Gov	3.497	3.457	-0.041***
	(0.898)	(0.918)	(0.015)
Level of Corruption	6.785	6.914	0.133***
	(2.710)	(2.687)	(0.048)

Note:

[1] No Exp means respondents who did not experience land expropriation, whereas Exp means ones who experienced.

[2] Standard errors in the differences in means are clustered by village, *p<.10; **p<.05; ***p<.01.

Table A3: Promotion Propensity (gKRLS and Probit)

	gKRLS	Probit
Start age	-0.015***	-0.167**
	(0.003)	(0.084)
Age	0.009***	0.070***
	(0.003)	(0.024)
Start age*Level		0.007
		(0.036)
Patronage(promotion)	-0.002	-0.038
	(0.008)	(0.074)
Patronage(homophily)	0.013	0.120
	(0.013)	(0.106)
Education	0.002	-0.031
	(0.007)	(0.069)
Admin Level	0.051***	0.394
	(0.013)	(1.796)
Central government	0.002	-0.079
	(0.013)	(0.132)
The Communist Youth League	0.017*	0.079
	(0.010)	(0.081)
Provincial government	0.005	0.119*
	(0.007)	(0.067)
Average GDP growth	0.099	1.095
	(0.111)	(1.004)
Province FE	Yes	Yes
Year FE	Yes	Yes

Note:
[1] Robust standard errors in parentheses. *p<.10; **p<.05; ***p<.01.

Figure A1: Distribution of Career Incentive Index

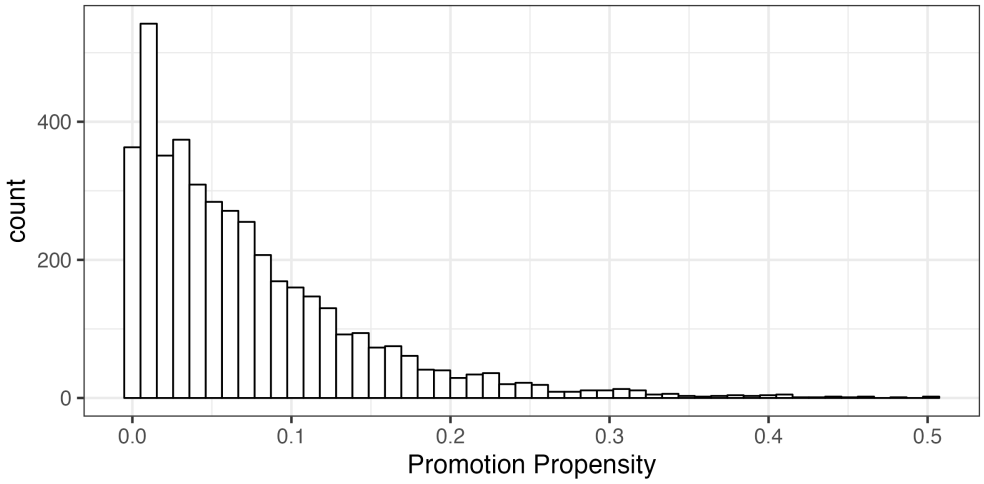


Table A4: Career Incentives and Auction Method

	Within-city		Cross-border	
	(1)	(2)	(3)	(4)
Career incentive	0.01***	0.01***	0.01***	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)
Dep. var. mean	0.11	0.11	0.11	0.11
# of observations	466775	466625	103650	103684
Quarter FE	Yes	Yes	Yes	Yes
Leader FE	Yes	Yes	Yes	Yes
City FE	Yes	Yes	No	No
Border pair FE	No	No	Yes	Yes
Controls	No	Yes	No	Yes

Note:

[1] Control variables include land quality evaluated by the local government's land bureau, land auction methods (English auction, two-stage auction, invited bidding), land distance to railway stations, distance to the city center, population density, and night light density.

[2] Standard errors clustered by cities in columns (1)-(2) and by borders in columns (3)-(4).. *p<.10; **p<.05; ***p<.01.

Table A5: Robustness Check for Career Incentive on Land Prices

	Within-city			Cross-border		
	Fiscal Pressure	FDI	Land Supply	Fiscal Pressure	FDI	Land Supply
Career incentivee	42.06***	43.53***	48.82***	30.58***	31.05***	31.20***
	(7.38)	(10.28)	(10.72)	(7.48)	(9.12)	(9.77)
Dep. var. mean	907.40	907.51	907.40	907.41	907.52	907.41
# of observations	466601	466432	466601	466584	466415	466584
Adjusted R^2	0.40	0.40	0.40	0.43	0.43	0.43
# of Borders	-	-	-	786	786	786
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Leader FE	Yes	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	No	No	No
Border pair FE	No	No	No	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Note:

[1] Control variables include land quality evaluated by the local government's land bureau, land auction methods (English auction, two-stage auction, invited bidding), land distance to railway stations, distance to the city center, population density, and night light density.

[2] Standard errors clustered by cities for within-city estimations and by borders for cross-border estimations. *p<.10; **p<.05; ***p<.01.

Table A6: Robustness Check using Probit Model

	Within-city		Cross-border			
					Distance <= 8*km*	
	(1)	(2)	(3)	(4)	(5)	(6)
Career incentive	53.897***	62.416***	44.142***	51.463***	34.958***	40.484***
	(13.443)	(12.428)	(9.180)	(8.547)	(12.764)	(13.232)
Dep. var. mean	907.25	907.40	907.27	907.42	835.33	835.33
# of observations	466742	466592	466724	466575	103649	103647
Adjusted R^2	0.38	0.40	0.41	0.43	0.43	0.44
# of Borders	-	-	-	785	694	694
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Leader FE	Yes	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	No	No	No
Border pair FE	No	No	No	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Note:

[1] Control variables include land quality evaluated by the local government's land bureau, land auction methods (English auction, two-stage auction, invited bidding), land distance to railway stations, distance to the city center, population density, and night light density.

[2] Standard errors clustered by cities for within-city estimations and by borders for cross-border estimations. *p<.10; **p<.05; ***p<.01.

Figure A2: Placebo Test

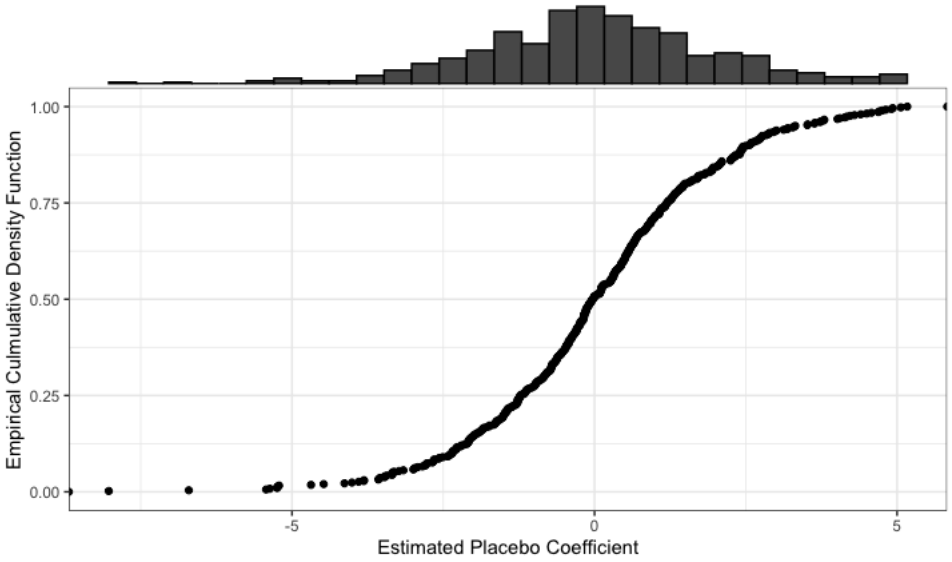


Figure A3: Mediation Results

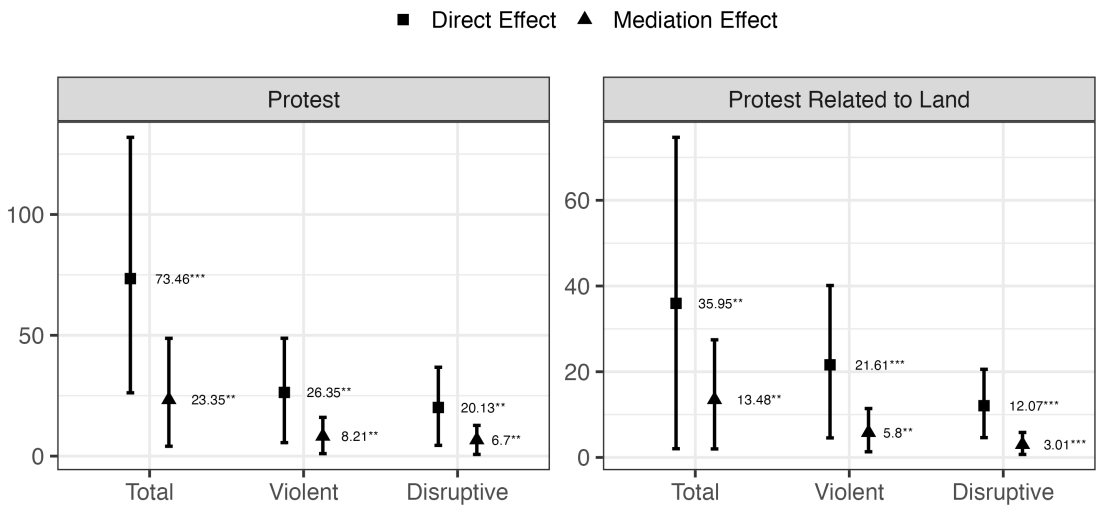


Figure A4: Sensitivity Anlysis

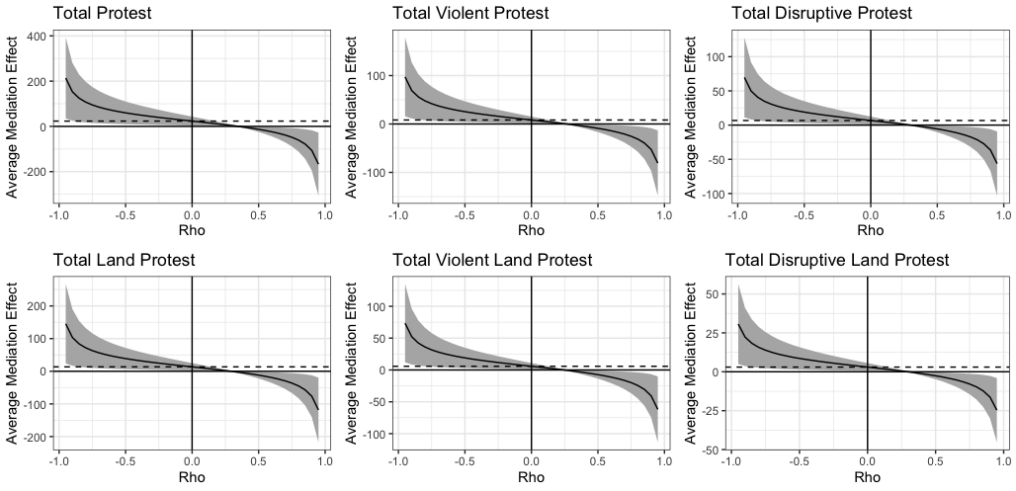


Table A7: Effects of Compensation Gap on Other Political Outcomes

	(1)	(2)	(3)	(4)
	Panel A: Political Trust			
Compensation Gap	-0.107	-0.107	-0.106	-0.106
	(0.141)	(0.153)	(0.154)	(0.154)
Dep. var. mean	4.880	4.835	4.835	4.835
# of observations	7091	6305	6305	6305
Adjusted R^2	0.269	0.265	0.266	0.265
Individual fixed effects	Yes	Yes	Yes	Yes
Village FE	Yes	Yes	Yes	Yes
Individual Controls	No	Yes	Yes	Yes
Time FE	No	No	Yes	Yes
	(1)	(2)	(3)	(4)
	Panel B: Government Evaluation			
Compensation Gap	-0.082*	-0.129**	-0.120**	-0.119**
	(0.049)	(0.052)	(0.052)	(0.052)
Dep. var. mean	2.524	2.533	2.533	2.533
# of observations	9504	8507	8507	8507
Adjusted R^2	0.250	0.251	0.254	0.254
Individual fixed effects	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes
Individual Controls	No	Yes	Yes	Yes
Time FE	No	No	Yes	Yes

Note:

[1] Individual level controls include gender, age, college degree, employment status in the government sector, membership in the Chinese Communist Party, living in rural or urban, and homeowner status.

[2] Standard errors clustered by households in parenthesis. *p<.10; **p<.05; ***p<.01.

Table A8: Placebo Test for Effects of Compensation Gap on Conflict

	Trust United States			Trust Stangers		
	(1)	(2)	(3)	(4)	(5)	(6)
Compensation Gap	0.022	-0.056	-0.053	-0.018	-0.064	-0.065
	(0.143)	(0.151)	(0.150)	(0.125)	(0.134)	(0.134)
Dep. var. mean	2.178	2.096	2.096	1.959	1.937	1.937
# of observations	6865	6107	6107	7089	6304	6304
Adjusted R^2	0.258	0.242	0.243	0.229	0.233	0.232
Individual fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes	Yes
Individual Controls	No	Yes	Yes	No	Yes	Yes
Time FE	No	No	Yes	No	No	Yes

Note:

[1] Individual level controls include gender, age, college degree, employment status in the government sector, membership in the Chinese Communist Party, living in rural or urban, and homeowner status.

[2] Standard errors clustered by households in parenthesis. *p<.10; **p<.05; ***p<.01.

Appendix B Second Appendix

B.1 Mean Difference Between the Whole Sample and Matched Listed Firms

In section 3.3 of the chapter 3, I construct my sample by matching China's listed firms with buyers' information I collected from China Land Market. In Table B1, I provide the mean comparison of land characteristics between the matched sample and the whole land transactions data from 2010 to 2017. Overall, this table shows that publicly listed firms buy more land but have lower land quality than non-public listed firms.

Table B1: Differences Between the Whole and Matched Firms

	Mean Matched	Mean Whole Sample	Mean Difference	P Value
Area	7.51	2.03	5.48	0.00
Price	11814.85	6027.90	5786095	0.14
Years of Usage	51.43	77.68	26.25	0.24
Land Level	11.66	10.56	1.1	0.00

Note:

[1] Area is measured by hectare, and price is measured ten thousand RMB. Land quality, assessed by the local government, is an overall evaluation of a parcel of land that is based on the area's economic prosperity, population density, traffic conditions, and infrastructure conditions. According to the Land Resources Bureau's criteria, there are fifteen levels of land quality. Level one represents the highest land quality, such as land in Shanghai and Beijing's central business district, whereas level fifteen represents the lowest land quality.

B.2 Mean Difference Between Unmatched and Matched Auction Records

In section 3.6 of the chapter 3, I matched my sample with data for land reserve prices and premium rates, which I collected from the website of each city's land resources bureau. Connected firms could strategically cooperate with local governments to not reveal auction information in order to cancel corruption behavior. To test whether my sample is biased

or not, I conduct a mean test between the matched sample and the unmatched sample. Overall, Table B2 shows that larger firms with more political connections are less likely to have auction records, which means there is a sample selection issue. In Appendix Table B6, I represent results based on the Heckman selection model.

Table B2: Differences Between Unmatched and Matched Auctions

	Matched Mean	Unmatched Mean	Mean Difference	P Value
Land Characteristics				
Area	7.2891	7.9662	-0.6771	0.0176
Price	7924.4629	17101.8029	-9177.3400	0.0000
Years of Usage	107.1341	107.1937	-0.0596	0.9412
Land Level	10.3024	9.1608	1.1416	0.0000
Firm Characteristics				
Log(Total Assets)	23.5006	23.6966	-0.1959	0.0000
Log(Total Employee)	8.6015	8.6060	-0.0044	0.8537
Log(Total Debt)	22.8286	23.0731	-0.2445	0.0000
Profit Per Share	0.7341	0.5899	0.1442	0.0000
General Political Connections	0.1030	0.1137	-0.0107	0.0336
Locality-specific Political Connections	0.0120	0.0182	-0.0062	0.0011
Local Experience	0.2070	0.2123	-0.0053	0.4237
Number of Political Connections	0.0161	0.0178	-0.0017	0.0009

B.3 Summary Statistics

Table B3 provides summary statistics of land transactions and listed firms. Panel A in the table is the summary statistics for land transactions. Panel B shows the summary statistics of the land reserve price and premium rate. Panel C provides summary statistics of listed firms.

The mean price was 2.84 million RMB per hectare (roughly 0.3 million USD, \$1=6.5RMB), and the mean land quality level was 9.42.[28] The average price of land sold to firms with

[28]Land quality, assessed by the local government, is an overall evaluation of a parcel of land that is based

LPCs was 3.05 million RMB, and 2.84 million RMB for firms without such ties. Panel A also shows that two-stage auctions are the dominant method for selling lands, being used by 77% of the full sample (77% of firms with no LPC and 63% of firms with LPCs). Bilateral agreements were used by 13% of firms with no LPCs and 26% of those with LPCs. English auctions were roughly 1% less likely to be used if the buyer has LPC. This evidence reflects the fact that transactions are more likely to be carried out using methods that are more prone to manipulation. Panel B summarizes the information on land auctions. It shows that the land reserve price is higher when a firm has LPCs, 5.60 million RMB, whereas the premium rate tends to be lower than for unconnected firms.

B.3.1 Land Transactions by Types of Political Connections

In the chapter 3, I construct 7 different measures of political connections. This table provides information on the percentage of land transactions by each type of political connection. Table B4 shows the distribution of different types of political connections across transactions. Approximately 8% of all the transactions involved firms with GPCs, whereas 17% related to firms with LE, and only 1% involved those with LPCs. Moreover, 34% and 36% of all firms have at least one senior executive or board member who is a CPPCC member or PC deputy, respectively; 19% of the transactions involved firms with connections of friends in government, whereas 8% have connections via relatives.

B.4 Effect of Auction Method on Land Prices

The Table B5 provides the estimations of the effect of different auction methods on land prices. The dependent variable is land prices in the logarithm. The two main independent variables-Invited Bidding & Bilateral Agreement, or Two Stage Auction-are dummy variables.

on the area's economic prosperity, population density, and traffic and infrastructure conditions. According to the Land Resources Bureau's criteria, there are fifteen levels of land quality. Level one represents the highest land quality, such as land in Shanghai and Beijing's central business district, whereas level fifteen represents the lowest land quality.

Table B3: Summary Statistics of Land and Firm

Panel A	(1)		(2)		(3)	
	Total		LPC=0		LPC=1	
	mean	sd	mean	sd	mean	sd
Land Price (Log)	5.65	1.87	5.65	1.87	5.72	2.14
Size of Area (hectare)	1.57	0.98	1.57	0.97	1.60	1.08
Land Quality	9.42	6.65	9.43	6.65	8.85	6.37
Years of Usage	51.55	16.92	51.56	16.98	51.07	11.62
Transaction Method(%)						
-English Auction	8.77		8.79		7.58	
-Two Stage Auction	76.86		77.07		62.68	
-Bilateral Agreement	12.97		12.79		25.66	
-Invited Bidding	1.40		1.36		4.08	
Panel B	(4)		(5)		(6)	
	Total		LPC=0		LPC=1	
	mean	sd	mean	sd	mean	sd
Reserve Price	7.05	2.16	7.06	1.84	6.33	2.93
Premium Rate (%)	3.52	16.11	3.54	16.21	1.90	6.87
Panel C	(7)		(8)		(9)	
	Total		LPC=0		LPC=1	
	mean	sd	mean	sd	mean	sd
Total Assets (Log)	23.60	1.85	23.60	1.86	23.71	1.50
Total Employees	8.54	1.58	8.53	1.58	8.93	1.39
Total Debt (Log)	22.96	2.16	22.96	2.16	23.09	1.72
State Enterprise(%)	43.03		42.47		81.63	

Note:

[1] Area is measured by hectare, and price is measured in ten thousand RMB. Land quality, assessed by the local government, is an overall evaluation of a parcel of land that is based on the area's economic prosperity, population density, traffic conditions, and infrastructure conditions. According to the Land Resources Bureau's criteria, there are fifteen levels of land quality. Level one represents the highest land quality, such as land in Shanghai and Beijing's central business district, whereas level fifteen represents the lowest land quality.

[2] The reserve price is the starting price during the auction. The land premium rate is calculated as: (Transaction Price-Reserve Price)/Reserve Price∗100%

Table B4: Land Transactions by Types of Political Connections

	Percent
General Political Connections (GPCs)	8.20%
Local Experience (LE)	17.61%
Locality-specific Political Connections (LPCs)	1.44%
CPPCC Member	33.65%
PC Deputy	35.97%
Government Friends	19.41 %
Relatives Connection	8.18 %

B.5 Robustness Checks

B.5.1 Robustness Check for the Effects of LPC on Land Reserve Price and Premium Rate

The Table B6 provides the re-estimation of Table 3.3 in the chapter 3 using Heckman selection model to reduce the sample selection bias concern. Overall, LPC effects are robust to sample selection bias.

B.5.2 Robustness Check for Event Study

Table B7 shows the robustness check when I add two additional political connection measurements. Column 1 to 4 report results after control for friends in government and relative connections. The coefficients for LPC and LE are still negative and highly significant. Most importantly, the magnitude of these coefficients are almost the same compared with the results in Table 3.4 in the chapter 3.

One could argue that this negative cumulative return is due to the effects of pessimistic expectations of the overall economy for places experienced political shocks. To reduce this

Table B5: Effect of Auction Method on Land Prices

	(1)	(2)
	Log(price)	Log(price)
Invited & Bilateral	-0.819***	-1.109***
	(-5.80)	(-5.89)
Two-stage Auction		-0.323***
		(-4.01)
Control Variables*	YES	YES
City Fixed Effects	YES	YES
Year Fixed Effects	YES	YES
Firm Fixed Effects	YES	YES
Observations	18926	18926

Note:

[1] The control variables are the average land price, land area, land use period, method of transaction, land quality, land purpose, percentage of total political connections on board, logged total assets, logged total employees, and firm's ownership.

[2] Two-way clustering standard errors in parentheses. *p<.10; **p<.05; ***p<.01.

Table B6: Results from Heckman Selection Model

	Log(Reserve Price)			Premium Rate		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
General Political Connections	-0.069	-0.072	-0.087	-3.814**	-4.073**	-2.905
	(0.145)	(0.141)	(0.144)	(1.649)	(1.689)	(1.831)
Locality-specific Political Connections	-0.451*	-0.472**	-0.427*	-11.108***	-12.161***	-10.513***
	(0.236)	(0.228)	(0.231)	(2.689)	(2.675)	(2.668)
Local Experience	-0.034	-0.028	-0.038	2.520***	2.474***	2.438***
	(0.079)	(0.080)	(0.079)	(0.652)	(0.653)	(0.662)
NPC	0.038	0.031	0.031	-0.198	-0.158	0.001
	(0.082)	(0.083)	(0.084)	(1.055)	(1.043)	(1.083)
CPPCC	0.039	0.049	0.039	-0.967	-1.155	-0.958
	(0.090)	(0.092)	(0.090)	(1.281)	(1.317)	(1.287)
Control Variables*	YES	YES	YES	YES	YES	YES
City Fixed Effects	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES
Firm Fixed Effects	YES	YES	YES	NO	NO	NO
Ownership Fixed Effects	YES	YES	YES	YES	YES	YES
Friends/Relatives Connections	NO	YES	NO	NO	YES	NO
Headquarter	NO	NO	YES	NO	NO	YES
Observations	4285	4285	4285	2374	2374	2374

Note:

[1] The control variables in models (1) to (3) are the average reserve price within cities, land area, land leasing period, auction method, land quality, intended usage of the land, percentage of firms' total political connections in board members, firms' total assets, total employees, total debt, and firm's ownership. The control variables in models (4) to (6) are the same as in (1) to (3) except for no control on auction methods.

[2] Standard errors are clustered by firm. *p<.10; **p<.05; ***p<.01.

concern, I created a dummy variable which equals one if firms located in places that experienced political shocks and otherwise zero. Results are reported in Table B8, Panel A. Overall, it shows the negative cumulative return I find above is not due to the pessimistic expectation of the overall economy. An additional concern is that the results are driven by investors' negative expectations of firms that have political connections regardless of the types of connections when localities are under political instability. To reduce this concern, I also create a dummy variable equal to 1 if firms have political connections other than locality-specific connections. Results are reported in Table B8, Panel B. Results show that if firms do not have locality-specific, firms will not experience negative cumulative abnormal returns, which means the local political connection is the only way to affect firms.

Table B7: Robustness Check for Stock Market Return

	(1)	(2)	(3)	(4)
	CAR[0]	CAR[-1,1]	CAR[-2,2]	CAR[-4,5]
General Political Connections	0.002	0.004	0.011**	0.020***
	(0.003)	(0.004)	(0.004)	(0.006)
Locality-specific Political Connections	-0.017***	-0.010*	-0.014*	-0.027***
	(0.006)	(0.006)	(0.007)	(0.009)
Local Experience	-0.001	0.003	0.001	-0.003
	(0.002)	(0.003)	(0.004)	(0.005)
PC	-0.001	-0.005	-0.003	0.005
	(0.003)	(0.004)	(0.004)	(0.005)
CPPCC	-0.004	-0.003	-0.005	-0.015***
	(0.002)	(0.003)	(0.004)	(0.005)
Friends in Government	0.010***	0.011***	0.012***	0.010*
	(0.003)	(0.003)	(0.004)	(0.005)
Relative Connections	0.004	0.004	0.004	0.017*
	(0.005)	(0.006)	(0.008)	(0.010)
Firm Level Controls*	YES	YES	YES	YES
Observations	1809	1809	1796	1796

Note:

[1] Firm level Control variables in all models are total assets, total employees, total debt, and firm's ownership.

[2] Robust standard errors are in parentheses. *p<.10; **p<.05; ***p<.01.

Table B8: Political Shocks and Firms Stock Market Return

	(1)	(2)	(3)	(4)
	CAR[0]	CAR[-1,2]	CAR[-2,2]	CAR[-4,5]
Panel A				
Political Shock Dummy	-0.003	-0.003	-0.002	0.005
	(0.005)	(0.006)	(0.007)	(0.009)
Panel B				
Political Connection Dummy	0.001	0.003	0.009**	0.017***
	(0.003)	(0.004)	(0.004)	(0.006)
Firm Level Controls*	YES	YES	YES	YES

Note:

[1] Firm level Control variables in all models are percentage of total political connection in board, logged total assets, logged total employees, firm's equity nature.

[2] Robust standard errors are in parentheses. *p<.10; **p<.05; ***p<.01.

B.6 Determinants of Disclosure of Friends and Relative Connections

The Table B9 provides an analysis of whether firms that choose to disclose friends' and relatives' connections are systematically different from ones that do not. In the table, SOE represents state-owned enterprises. This table shows that there is some evidence that firms with more employees and political connections are less likely to report they have friends' and relatives' connections.

Table B9: Determinants of Friends and Relative Connections

	(1)	(2)
	Government Friends	Relatives Connection
Toal Asset	-0.0255	-0.0130
	(-0.74)	(-1.42)
Total Employee	0.0234*	-0.00617*
	(1.68)	(-1.70)
Total Debt	0.0186	0.0233***
	(1.21)	(2.74)
SOE	0.0452	0.0174
	(1.11)	(1.26)
Percent of Political Connections	-0.0860	-0.123*
	(-0.41)	(-1.75)
Constant	0.179	-0.0871
	(0.37)	(-0.94)
Observations	20268	20268

Standard errors are clustered by firm

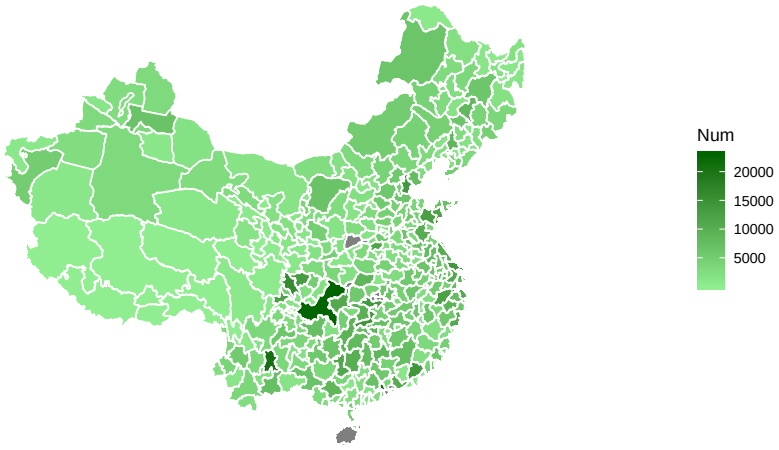
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

B.7 Figures

B.7.1 Land Transaction in China, 2010-2017

Figure B1 provides overall information on all land transactions in China between 2010 to 2017, which I web-scraped from the website of the China Land Transaction Monitoring System.

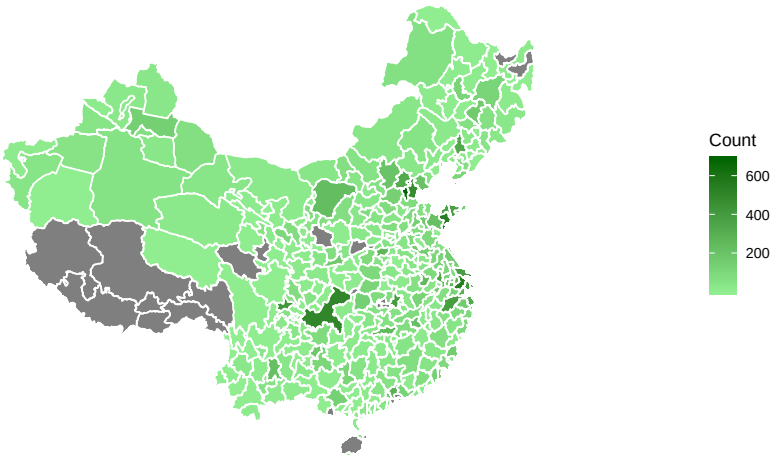
Figure B1: Land Transaction in China, 2010-2017



B.7.2 Land Transaction by Public Listed Firms in China, 2010-2017

Different from Figure B1, Figure B2 shows the distribution of land transactions by publicly listed firms. This is also the data I used for my analysis in the chapter 3. This figure shows except for a few cities where there were no observations, firms engaged in land transactions in almost every city in China. This may also help reduce the concerns that my matched data may be geographically biased.

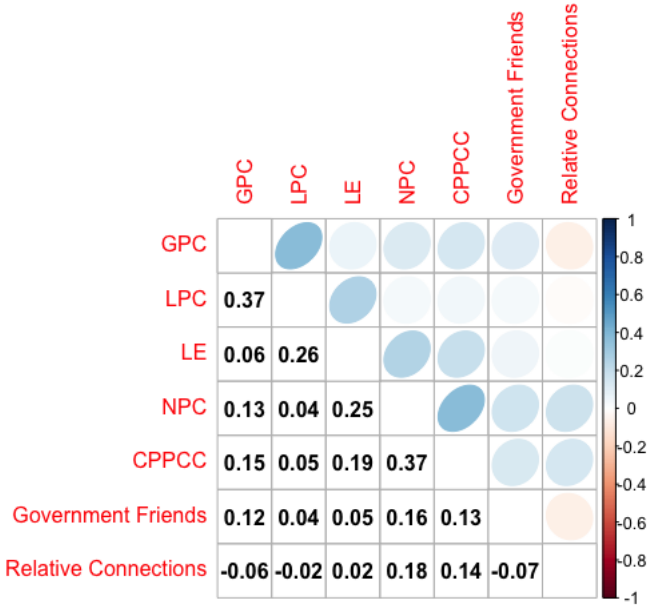
Figure B2: Land Transaction by Public Listed Firms in China, 2010-2017



B.7.3 Correlation Matrix for Different Connection Measurements

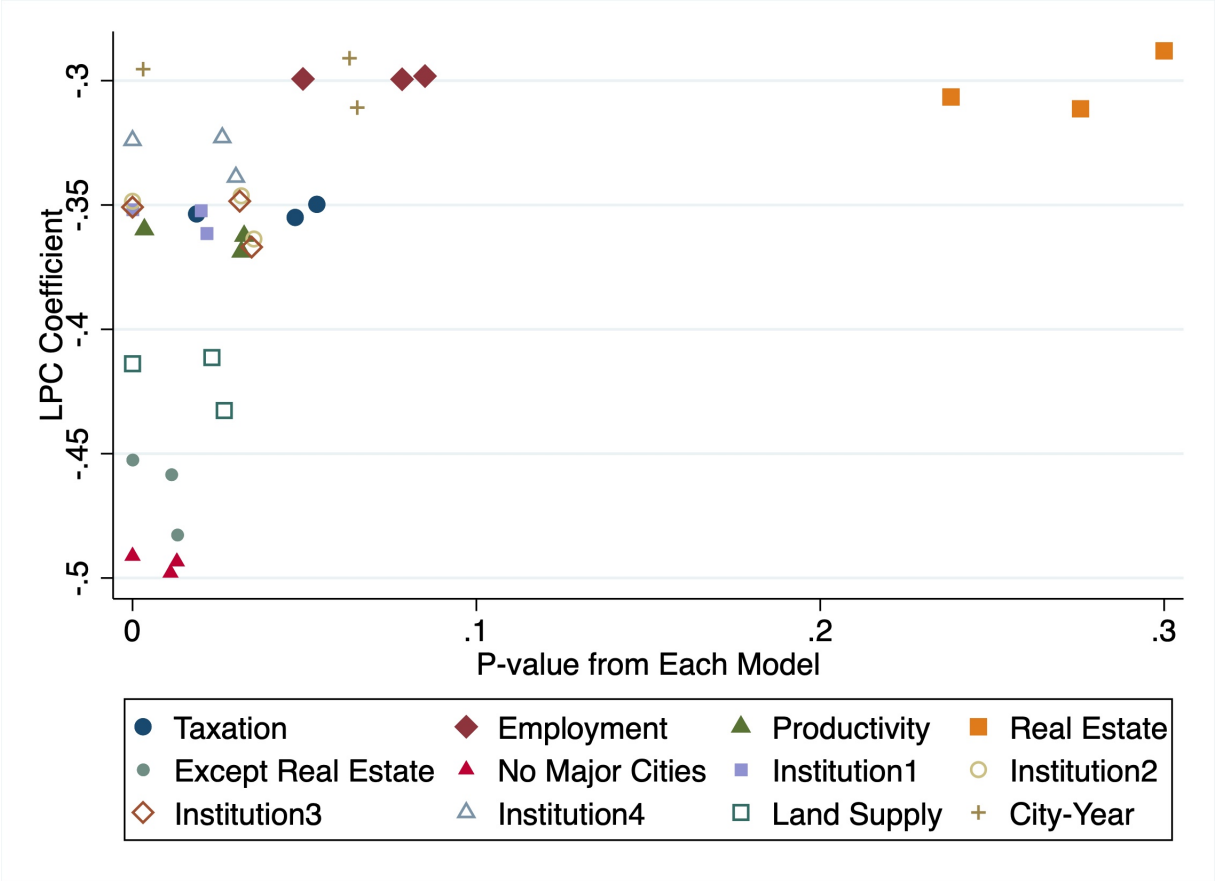
In the chapter 3, I construct 7 different measures of political connections. Figure B3 shows the correlation between each connection measure. The blue color represents two variables have positive correlation, whereas the red color means they have a negative correlation. The darker the color, the strong the correlation. Figure B3 reduces the concern that there could be a strong inter-correlation between different connection measures. This also provides some evidence that my 7 connection measures capture different perspectives of connections.

Figure B3: Correlation Matrix for Different Connection Measurements



B.7.4 Robustness Checks for the Effect of LPC on Land Price

Figure B4: LPC Coefficients for Different Robustness Checks



In this section, I present several robustness checks in addition to the results in the main chapter 3.

The No Major Cities models in Figure B4 report the results using samples without major cities, such as Beijing, Shanghai, Tianjing, and Guangdong. The effect of LPC is around 22%, which is slightly lower than my baseline model, and statistically significant. This reduces concerns that my results are mainly driven by large municipalities, where land resources are subject to intense competition and where firms have greater incentives to build connections.

Firms could also choose to do business in places where the overall quality of governance is low so they could easily build political connections and obtain benefits. However, the

quality of governance can be measured in different ways, and it is difficult to measure the quality of sub-national governance in a politically centralized authoritarian country. Following previous studies on measuring national-level institutional quality, I use GDP per capita (Acemoglu et al., 2019), percentage of foreign direct investment in GDP (Buchanan, Le and Rishi, 2012), lagged patents per capita (Wang, 2013), and lagged corruption cases that have been investigated (Bologna, 2017) to proxy for institutional quality.[29] Models marked as Institution1 to Institution4 report the results using the above measures, respectively. Overall, there is no substantive difference after I controlling for institutional quality.

The total land supply could also be a confounding variable, because firms may strategically choose to build political connections in localities with a large supply of land and where firms face less competitions when buying lands [30]. Models marked as Land Supply show that the LPC effect is slightly greater than the effect in original model, but it is still consistent with Hypothesis 3.1.

[29]All variables are measured by city.

[30]The land supply is measured by the geographical area of the locality

Appendix C Third Appendix

C.1 Summary Statistics

Table C1 shows the summary statistics for the core variables. The average promotion rate for for party secretary it is 7%. The average age in my sample is 52. For information asymmetry measure, the higher this number, the more severe the asymmetric information. The mean of this measure is 12, with min 8 and max 16.

C.1.1 Balance Test for RDD

Table C2 displays descriptive statistics in Columns 1 and 2 for prefecture party secretaries, differentiating between those with high promotion incentives and those with low promotion incentives based on various personal characteristics. In Column 3, I present the raw difference between the means of these two groups. It is crucial to emphasize that this statistic represents a direct comparison between all prefecture party secretaries before and after the age of 57, without necessarily reflecting a discontinuous difference precisely at the age threshold.

The findings derived from mean differences analysis reveal systematic disparities between politicians characterized by high incentives and those with low incentives. High-incentive politicians tend to possess college degrees, exhibit prior work experience within the Communist Youth League, and demonstrate a greater likelihood of having affiliations with provincial-level leaders. Additionally, cities managed by high-incentive politicians tend to experience a higher average rate of economic growth compared to those with low-incentive counterparts. However, it is noteworthy that the fiscal revenue, represented on a logarithmic scale, is lower in cities governed by high-incentive politicians. Notably, when I restrict the analysis to a 6-year period before and after the age threshold of 57, there is no discontinuity in all of these characteristics.

Table C1: Summary Statistics

Variable	Mean	Sd	Min	Max
Promotion1	0.07	0.25	0.00	1.00
Connection	0.63	0.48	0.00	1.00
GDP Growth	0.10	0.04	-0.09	0.25
Central Experience	0.07	0.26	0.00	1.00
Tenure	3.07	1.84	0.00	5.84
Age	51.96	3.90	38.00	63.00
Years of Party Membership	28.60	4.95	11.00	52.00
Distance to Provincial Capital (km)	219.41	181.05	0.00	1262.06
Terrain Ruggedness Index	9.18	6.89	0.96	30.63
Information Asymmetry	11.61	1.66	7.96	15.89
Sex				
... Female	3%			
... Male	97%			
Highest Education Level				
... Below Bachelor	6%			
... Bachelor	25%			
... Master or Above	69%			
Ethnicity				
... Han	91%			
... Ethnic Minority	9%			

Note:
[1] Statistics report for Sex, Highest Education Level, and Ethnicity are percentage of people in the whole data.

Table C2: Summary Statistics of Politician Data

	Low Incentive Mean	High Incentive Mean	Differences in Means	RD Estimates Local Linear
Promotion	0.018	0.084	0.066***	0.060***
	(0.135)	(0.277)	(0.013)	(0.018)
College	0.429	0.584	0.155***	0.001
	(0.495)	(0.493)	(0.030)	(0.031)
State Enterprise Exp	0.188	0.156	-0.032	0.006
	(0.391)	(0.363)	(0.022)	(0.015)
The Communist Youth League Exp	0.083	0.199	0.116***	-0.030
	(0.277)	(0.400)	(0.018)	(0.018)
Sex	0.013	0.035	0.021***	0.003
	(0.114)	(0.183)	(0.006)	(0.006)
Ethnicity	1.922	1.905	-0.017	-0.012
	(0.268)	(0.293)	(0.014)	(0.013)
Patronage(Promotion)	0.457	0.673	0.215***	0.001
	(0.498)	(0.469)	(0.021)	(0.032)
Patronage(Homophily)	0.193	0.231	0.037	0.029
	(0.395)	(0.421)	(0.022)	(0.017)
Ave GDP Growth	0.097	0.101	0.004*	0.003
	(0.038)	(0.037)	(0.002)	(0.002)
GDP per capita	9.716	9.509	-0.207***	-0.011
	(0.851)	(0.779)	(0.070)	(0.053)
FDI	9.467	9.036	-0.431***	0.118
	(2.042)	(1.946)	(0.144)	(0.102)
Fisical Revenue	13.446	12.853	-0.594***	-0.087
	(1.274)	(1.197)	(0.071)	(0.084)

Note:

[1] This table provides summary statistics, differences in means, and local RD estimate between city party secretaries who have high career incentive and ones who have low career incentive by the age cutoff of 57. Politicians whose age is below 57 belong to high incentive group whereas whose age is above 57 belong to low incentive group. The statistics in the first three columns are calculated based on the whole party secretaries' sample between 2000 and 2015, whereas the local RD estimates are calculated based on samples that only includes politicians whose age is between the 5 years bandwidth.

[2] Promotion is measured by promotion to vice provincial positions with active roles. Patronage is measured by two indicators. Patronage(Promotion) is promotion based measurement, see Jiang (2018). Patronage(Homophily) is overlap based measurement, see Opper, Nee and Brehm (2015).

[3] Standard errors in the differences in means and RD estimates are clustered by city and year, *p<.10; **p<.05; ***p<.01.

C.2 Robustness Checks and Placebo Test

This section provides multiple robustness checks and placebo tests for the results reported in the chapter 4.

C.2.1 Robustness Checks for Productivity

The Malmquist Productivity Index can be divided into two components: technical efficiency change and technology change. I utilize the technical efficiency change as an additional metric to assess the robustness of my findings.

Results are presented in Table C3. Column (1) indicates that a one standard deviation increase in real estate investment leads to a 0.03 decrease in TFP, while column (3) shows that a one standard deviation increase in human capital investment results in a 0.024 increase in TFP. These outcomes align with the observations in Table 4.2, reinforcing the notion that opportunistic investments diminish productivity and are detrimental to long-term growth potential.

C.2.2 Robustness Checks for Information Asymmetry Effect

Another method for assessing information asymmetry involves calculating the actual road distance between a city and its provincial capital. This metric is derived from OpenStreetMap (OSM), a worldwide open-access mapping initiative. Road distances are determined using automobiles as the mode of transportation. The benefit of this supplementary metric is its ability to reflect accurate distances. However, a drawback is that this measurement is based on the current road network, which has improved and become more extensive than in the past. Consequently, it may not accurately represent travel times and distances from previous years. When evaluating results obtained from this metric, it's crucial to recognize that it likely represents the lower bound effects of information asymmetry.

Table C4 displays the results. Columns (1) and (2) reveal that a one standard deviation increase in information asymmetry motivates local leaders to invest 0.04 standard deviations more in real estate. Conversely, the same increase leads to a reduction in investment in human capital by 0.033, as shown in column (3). Overall, these results align with the main findings, suggesting that information asymmetry drives local leaders to skew resource allocation towards opportunistic investments, with provincial-level preferences remaining constant.

I also conduct a placebo test, the core idea of which is to employ a distance measure that

Table C3: Robustness Check for Productivity Analysis

	TFP			
	(1)	(2)	(3)	(4)
Real estate	-0.030***	-0.036***		
	(0.006)	(0.008)		
Human capital			0.024***	0.060***
			(0.007)	(0.016)
Dep. var. mean	1.02	1.02	1.02	1.02
# of observations	3599	3582	3599	3595
Adjusted R^2	0.45	0.46	0.45	0.47
Year FE	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes

Note:

[1] Fixed effect models contain prefecture-level control variables: the percentage of primary industrial output in total GDP and total population. In models (1) and (2), they also have total education and science investment while in models (3) and (4), they have total fixed investment as control variables.

[2] Standard errors clustered by cities in parentheses, *p<.10; **p<.05; ***p<.01.

Table C4: Robustness Check Using Road Distance

	Real Estate		Human Capital	
	(1)	(2)	(3)	(4)
Information asymmetry	0.039***	0.040***	-0.033***	-0.043***
	(0.013)	(0.014)	(0.011)	(0.012)
# of observations	3941	3492	3245	2965
Adjusted R^2	0.60	0.54	0.47	0.48
Province and Year FE	Yes	Yes	Yes	Yes
Econ Controls	Yes	Yes	Yes	Yes
Politician Controls	No	Yes	No	Yes

Note:

[1] Fixed effect models contain prefecture-level control variables: GDP per capita, total population, and the percentage of primary industrial output in total GDP. They also include politicians' characteristics: connection with provincial leaders, age, gender, level of education, and tenure at current positions.

[2] Standard errors clustered by provinces in parentheses, *p<.10; **p<.05; ***p<.01.

does not capture the information asymmetry between prefecture leaders and their political principals. Consequently, I anticipate finding null results with this placebo treatment. For this purpose, I redefine the information asymmetry index as the distance between prefectures and the capitals of their nearest provinces. Table C5 presents the estimation results. While the coefficients in columns (1) and (2) are significant, their directions contradict theoretical expectations. Meanwhile, the results from columns (3) and (4) are statistically insignificant. Overall, the placebo test provides additional support for the role of information asymmetry in resource misallocation.

Table C5: Placebo Test for Effects of Information Asymmetry

	Real Estate		Human Capital	
	(1)	(2)	(3)	(4)
Information asymmetry	-0.121***	-0.144***	-0.004	-0.007
	(0.019)	(0.022)	(0.012)	(0.013)
# of observations	4363	3889	3590	3297
Adjusted R^2	0.49	0.50	0.48	0.48
Province and Year FE	Yes	Yes	Yes	Yes
Econ Controls	Yes	Yes	Yes	Yes
Politician Controls	No	Yes	No	Yes

Note:

[1] Fixed effect models contain prefecture-level control variables: GDP per capita, total population, and the percentage of primary industrial output in total GDP. They also include politicians' characteristics: connection with provincial leaders, age, gender, level of education, and tenure at current positions.

[2] Standard errors clustered by provinces in parentheses, *p<.10; **p<.05; ***p<.01.

C.2.3 Robustness Checks for Career Incentives

I perform multiple robustness checks for the Regression Discontinuity Design. First, I change the kernel type to triangular to demonstrate that the results are not dependent on

a particular kernel type. Second, I adjust the bandwidth to 5 years on both sides of the age cutoff to illustrate that the findings are robust to the choice of bandwidth.

Table C6: Robustness Check Using Different Kernel

	Real Estate		Human Capital	
	(1)	(2)	(3)	(4)
Information*Career	0.043*	0.042*	-0.011	-0.009
	(0.026)	(0.025)	(0.019)	(0.019)
# of observations	2210	2210	2201	2201
Adjusted R^2	0.56	0.57	0.48	0.49
Province and Year FE	Yes	Yes	Yes	Yes
Econ Controls	Yes	Yes	Yes	Yes
Politician Controls	No	Yes	No	Yes
Kernel Type	Triangle	Triangle	Triangle	Triangle

Note:
[1] Prefecture-level economic control variables include GDP per capita and the percentage of primary industrial output in total GDP. They also include politicians' characteristics: connection with provincial leaders, gender, level of education, and tenure at current positions.
[2] Standard errors clustered by provinces in parentheses, *p<.10; **p<.05; ***p<.01.

Tables C6 and C7 present the results. Across these different selections of kernel type and bandwidth, I observe consistent results: career incentives of local leaders prompt them to allocate more resources to the real estate sector and less to human capital investment. However, the results concerning human capital investment are not statistically significant.

C.2.4 Robustness Checks for Career Incentives of Provincial Leaders

I conduct two placebo tests to evaluate the impact of provincial leaders' career incentives on resource allocation. The central variable in this analysis is a dummy variable that signifies the eligibility for promotion of provincial leaders. In the first placebo test, I select an age

Table C7: Robustness Check Using Different Bandwidth

	Real Estate		Human Capital	
	(1)	(2)	(3)	(4)
Information*Career	0.043*	0.044*	-0.011	-0.008
	(0.023)	(0.023)	(0.018)	(0.018)
# of observations	2210	2210	2201	2201
Adjusted R^2	0.54	0.54	0.48	0.48
Province and Year FE	Yes	Yes	Yes	Yes
Econ Controls	Yes	Yes	Yes	Yes
Politician Controls	No	Yes	No	Yes
Kernel Type	Uniform	Uniform	Uniform	Uniform

Note:

[1] Prefecture-level economic control variables include GDP per capita and the percentage of primary industrial output in total GDP. They also include politicians' characteristics: connection with provincial leaders, gender, level of education, and tenure at current positions.

[2] Standard errors clustered by provinces in parentheses, *p<.10; **p<.05; ***p<.01.

threshold that is not expected to influence the career prospects of provincial leaders, and hence, should not affect their strategic allocation of resources. Table C8 displays the findings. Across all models, the interaction terms are not statistically significant and do not align with theoretical expectations.

Table C8: Robustness Check for Provincial Leaders

	Real Estate		Human Capital	
	(1)	(2)	(3)	(4)
Career incentive	-0.020	-0.035	-0.059	-0.021**
	(0.022)	(0.022)	(0.038)	(0.009)
Information*Incentive	-0.011	-0.005	0.040	0.004
	(0.015)	(0.015)	(0.036)	(0.005)
# of observations	3928	3863	3881	3847
Adjusted R^2	0.67	0.68	0.89	0.94
City FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes

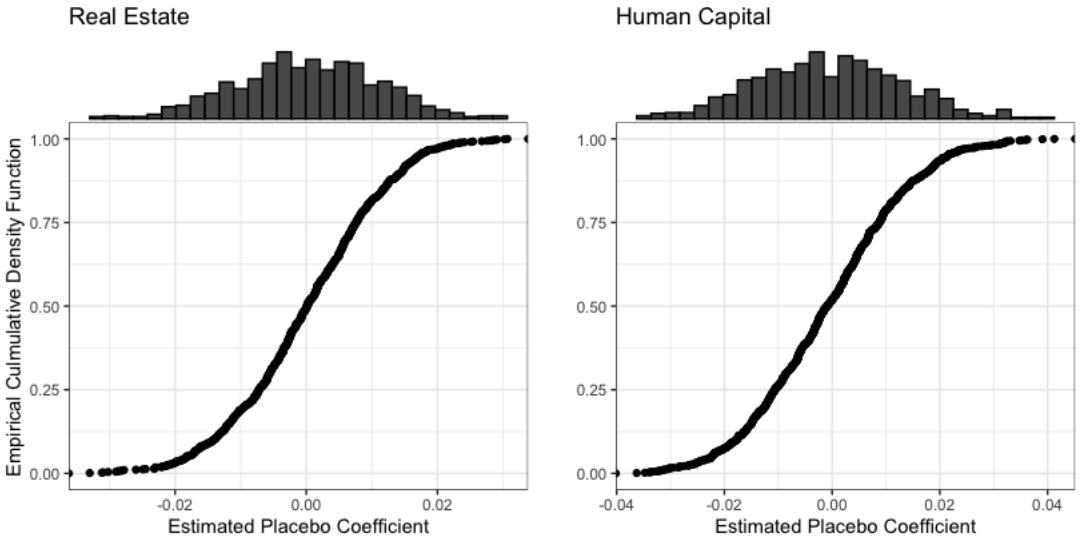
Note:
[1] Prefecture-level economic control variables include GDP per capita and the percentage of primary industrial output in total GDP. They also include politicians' characteristics: connection with provincial leaders, gender, level of education, and tenure at current positions.
[2] Standard errors clustered by provinces in parentheses, *p<.10; **p<.05; ***p<.01.

The second placebo test is a permutation test. The procedures are the following:

1. Randomly sample ages and redefine career incentives of party secretaries based on new ages.
2. Re-executed the analysis using this modified age distribution.
3. Run simulation 1000 times. During each iteration, I record the coefficient values for the interaction between career incentives and growth competition.

Figures C1 plot the empirical distribution of estimated coefficients obtained from the simulation results. First, the interaction effect for real estate model in the chapter 4 is about 0.043. This value significantly greater than the estimated placebo coefficient shown in "Real Estate" in Figure C1, lending substantial support that my main findings are not influenced by unobserved variables. A similar line of reasoning can be applied to the human capital analysis, which is approximately -0.189 in the chapter 4. This value stands in stark contrast to the placebo coefficients report in "Human Capital", reinforcing the robustness of the conclusions.

Figure C1: Permutation Test



C.3 Figures

C.3.1 Information Asymmetry Measure

C.3.2 Distribution of TFP

Figure C2: Terrain Map

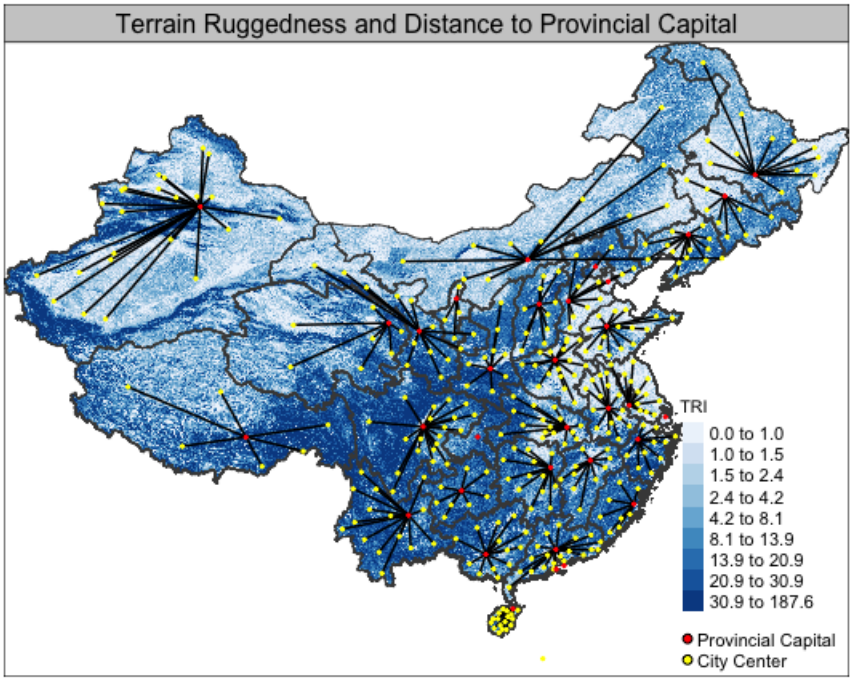


Figure C3: Terrain Profile and Information Asymmetry Measure

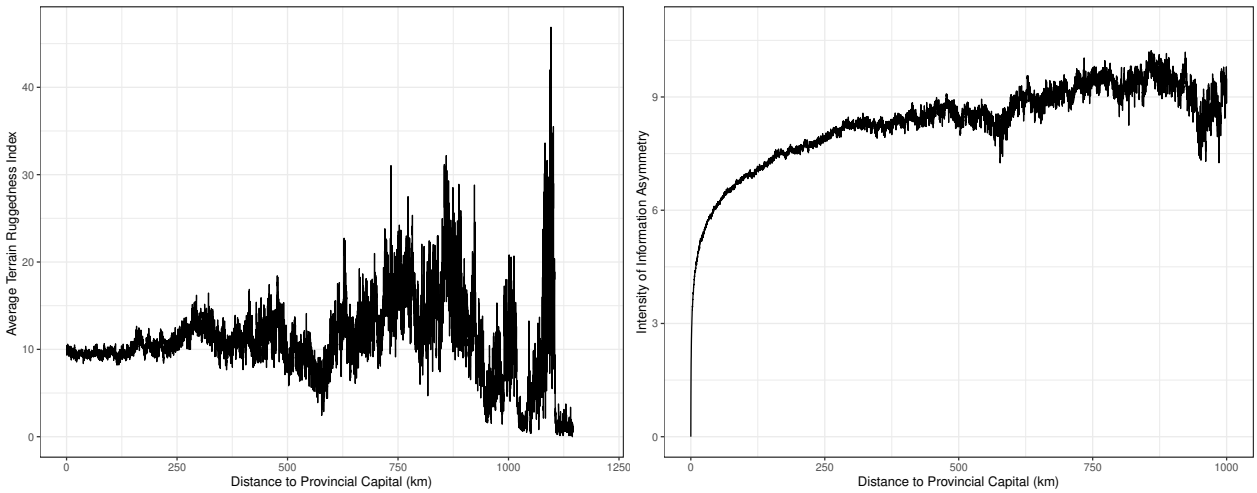
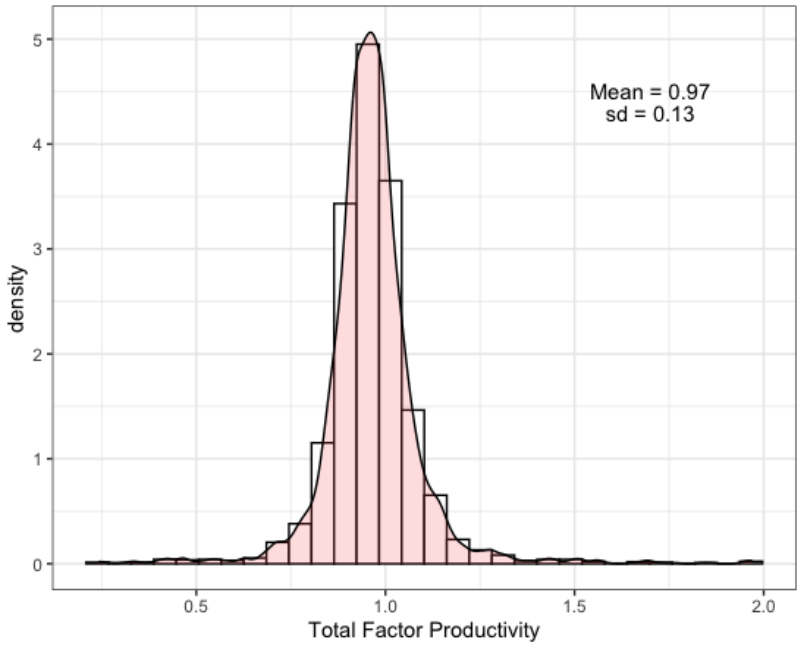


Figure C4: Distribution of TFP



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